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Developments in the Use of the Newer Organic Insecticides of Public Health Importance*

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IN June, 1946, Bishopp [1] reviewed comprehensively in this *Journal* the position of DDT in the control of insects of medical importance. His resumè covered the literature through most of 1945 and part of 1946. Since then, reports of experience with this compound have multiplied exceedingly. To them have been added numerous accounts of other insecticides, the accomplishments of which have been popularly represented in some instances as surpassing even the most fantastic predictions made about DDT. Without attempting to review minutely the formidable array of scientific and popular contributions concerning all of these substances, the following notes compend the characteristics of some of the more important insect killing chemicals having significance in public health practice.

For relatively exhaustive compilations of insecticides, their diluents, and adjuvant chemicals, the following sources should be consulted. The first volume of Frear's *Catalogue of Insecticides and Fungicides*, published in 1947, deals exclusively with chemical insecticides.[2]

It lists the official names and formulas of several thousand chemical compounds, condensation products, and miscellaneous substances alleged to have insecticidal properties. Information is summarized concerning their synonyms, the organisms against which insecticidal tests have been made and results obtained, together with author references. The seventh edition of *Entoma*,[3] also published in 1947, is an assembly of general information about insecticides and fungicides, their diluents, spreaders, penetrants, adhesives, etc., together with rosters of their trade names and the industrial sources from which these chemicals can be obtained. Cupples' list of *Proprietary Surface-active Agents of Possible Use in Insecticidal Prepara-*

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tions[4] contains the commercial names and sources of insecticidal accessories, their physical properties, industrial uses, chemical composition, and the purposes for which they are suitable (i.e., emulsifier, detergent, wetting agent, etc.). This very useful summary was released by the U. S. Department of Agriculture in 1943 and merits revision. The *Blue Book* for 1947,[5] issued by the publishers of *Soap and Sanitary Chemicals*, is an up-to-date listing of industrial sources for insecticides and associated chemicals.

There is at present no officially authorized procedure for designating nonproprietary names of insecticides for general use. The complex nature of these substances makes the use of exact chemical names impracticable and undesirable for this purpose. The only existing basis for the acceptance of generic names or designations is voluntary compliance with suggested practice on the part of governmental, professional, and commercial interests. This is time-consuming at best and is not always successful in the long run. In the meantime, it permits the entry into the literature of abbreviated laboratory designations, such as initials or accession numbers, or multiple trade names for the same compound. In later years, these may be difficult to identify with generic names in current use. The Interdepartmental Committee on Pest Control * has taken the initiative in promoting the standard usage of non-proprietary names of insecticides, rodenticides, etc., by recommending "common" names or designations to be defined and registered with the U. S. Patent Office to preëmpt their use as trade-mark names. Other organizations having legitimate concern with this problem are the American Chemical Society, the American Association of Economic Entomologists, the American Medical Association, and the American Veterinary Medical Association. As far as possible, the names of insecticides used in this review are those endorsed by the Interdepartmental Committee. Important laboratory or trade synonyms are shown in footnotes.

* Composed of representatives from the Bureau of Entomology and Plant Quarantine of the Agricultural Research Administration and the Insecticidal Division of the Production and Marketing Administration (both of the U. S. Department of Agriculture), the U. S. Public Health Service, and the Food and Drug Administration (both of the Federal Security Agency), the Fish and Wildlife Service of the U. S. Department of the Interior, the Army, and the Navy.

DDT *

Shortly after Dr. Bishopp's article[1] appeared, a comprehensive review of *DDT and Other Insecticides and Repellents Developed for the Armed Forces*[6] was published by the U. S. Department of Agriculture. Since then the literature on DDT has continued to pyramid though much of it is concerned with problems of little immediate interest to public health or with refinements and further details on uses that had been suggested previously. Two semi-popular books have been published on DDT.[7, 8]

From the public health standpoint in this country, the most important development during the past two years has been the accumulation of vast practical knowledge in the use of DDT in civilian malaria control programs. During the calendar years 1945, 1946, and 1947, nearly 3.2 millions of house-spraying applications were made in rural areas or small towns in over 300 counties by the health departments of 13 states in coöperation with the U. S. Public Health Service. The average number of sprayings per house varied from nearly two in 1945 to not quite one and one-half in 1947, when 875,534 different houses were treated.[9] This

* This seems to be the universally accepted designation for the various mixtures of the para-para and ortho-para isomers of dichloro-diphenyl-trichloroethane used as insecticides. The laboratory designation, *SBLY*, used by the Orlando Laboratory of the USDA Bureau of Entomology and Plant Quarantine, and the trade names *Gesarol* and *Neocid* have appeared in previous literature. The initials *GNBA*, gesarol neocide base, American, have also been used.

extensive experience has produced basically standardized operational procedures [10] with some regional variations as to the number, extent, and DDT content of the applications per year.[11, 12] The rate generally recommended in this country for indoor residual application against mosquitoes and flies remains, as in 1945,[1] 200 mg. per sq. ft.[13–16] (one gal. of 5 per cent DDT mixture per 1,000 sq. ft.) of treated surface. Highly satisfactory anopheline control has been obtained for the entire season in unoccupied houses in southeastern Georgia with a single application of 200 mg. of DDT on walls, ceilings, and the backs and undersides of furniture.[15]

The insecticidal effectiveness and durability of DDT on various types of surfaces have been studied in reference to *Anopheles quadrimaculatus*,[14, 17,18] the principal malaria vector east of the Great Divide, and house flies, *Musca domestica*.[16, 19] In general, the results were similar though house flies were found slightly more susceptible to DDT than were anopheline mosquitoes [16]; the females of both were more resistant than the males.[14, 16] Under laboratory conditions, residual effectiveness was lost faster when treated surfaces were exposed to house flies than to the same number of mosquitoes due, presumably, to the numerous body deposits of the house flies.[16] Smoke and grease deposits also interfered with the effectiveness of DDT.[18]

Rough surfaces, as unplaned wood, wallpaper, wall-board, natural fabrics, pitted metal, etc., remained highly lethal for 6 months or more [19]; smooth surfaces, as glass, tile, plexiglass, etc., failed to retain toxic films of DDT for as long a period. Freshly shellacked or painted wood, linoleum, dried mud, cement, new metal screen, synthetic fabrics, etc., gave very inferior results.[17, 18] The penetration of DDT into woods of various types and the effects of DDT concentration and the volatility of solvents on the recoverability of DDT from sprayed wood surfaces have been studied.[20]

There appeared to be little difference in effectiveness between the same concentrations of oil-borne and water-emulsified DDT [17] though in native huts (thatched roof, mud walls) in India, the emulsion was preferable.[21] Water-wettable DDT showed definite superiority to DDT-xylene deposits on cement, and better results on new metal and glass. The former product deteriorated faster on outside than interior surfaces.[17]

DDT was removed or denatured by dry-cleaning, paste wallpaper cleaner, ironing with a hot flat-iron, and vigorous brushing.[17] It was reduced slightly by the first vacuum cleaning but not by subsequent cleanings. It was not removed to any great extent by sponging with soap and water or by light dusting.

Standard practices have been developed in the application of DDT as an anopheline larvicide.[22] A method of using as little as 0.05 lb.[23] of DDT per acre dissolved in one gallon of fuel oil and applied as a mist from a hand-operated compressed-air sprayer was shown to be effective in controlling malaria mosquitoes and was more efficient and economical than any of the older larviciding techniques.[23–25]

Perhaps the most important recent development in the use of DDT in disease prevention is its extensive and successful use in the control of endemic or murine typhus fever by reducing rat flea populations.[26, 27] Detailed procedures for this purpose have been developed.[28, 29] During the last 3 years, these have been applied on a large scale by various state health departments in coöperation with the U. S. Public Health Service. Their use has been associated with significant reductions in the numbers of reported human cases of murine typhus fever, the incidence of rats positive for typhus complement-fixation, and the occurrence of the oriental rat flea,

Xenopsylla cheopis.[30] DDT is less effective against rat mites and lice than against *X. cheopis*.[31]

Practical methods of application have also been developed for use of DDT in the control of house flies[32] and of blow flies.[33] DDT is relatively ineffective as a larvicide against these two types of flies and thus is used chiefly against the resting adults. It follows that determination of their normal resting habits and application of the spray in accordance with this information is essential to successful control. These publications emphasize the point that DDT should not be used as a substitute for adequate sanitary measures, particularly around food handling establishments.

Thoroughness of application to insure the deposit of DDT in resting places is also stressed in the control of cockroaches.* Stenburg[34] suggests DDT in a combination of a spray and a dust for this purpose, though the use of chlordane has gained wide favor in the control of these insects.

Residual sprays of DDT have been used with great success in the control of sandflies of the genus *Phlebotomus* in Italy,[35] Palestine,[36] and Peru.[37] This gives great hope for the prevention of sandfly-transmitted diseases such as dermal and visceral leishmaniasis, bartonellosis, sandfly fever, etc.

Thompson has shown that residual deposits of DDT are lethal to the common species of scorpion in the West Indies.[38]

During 1946, and especially in 1947, there were widespread complaints that DDT was less effective than it had been during the first year of general use. Investigations of some of them[39] indicated that they were concerned almost entirely with flies—not mosquitoes—even though the DDT applications had been directed against malaria mosquitoes instead of flies. Poor sanitation resulting in high levels of fly production was directly responsible for some of these conditions. It is believed that many of the complaints were largely psychological, deriving from a decreased tolerance to even small numbers of flies caused by a year or more of relative freedom from large numbers of flies as a result of the early applications of DDT.

Strains of *Musca domestica* shown to be naturally resistant to DDT have been reported from Italy.[40] It has been shown possible by laboratory exposure to DDT space sprays to develop a strain of house flies abnormally resistant to DDT,[41] and the strain thus isolated was also unusually resistant to chlordane, pyrethrum and rotenone.[42] It is concluded that the method of selection developed an unusually strong stock of flies rather than one having a specific resistance to DDT. To what extent this phenomenon entered into the basis for the complaints against DDT in the southeastern states during late 1946 and 1947 is not known.

Recent papers have adduced evidence suggesting that the contact repellency of residual DDT may be as important as its insecticidal qualities in reducing the numbers of *Anopheles maculipennis atroparvus*,[43] *Aedes aegypti*,[43] *Anopheles gambiae*,[44] and *Culex tarsalis*,[45, 46] on sprayed resting places. It appeared in some instances,[44–46] that mosquitoes may even engorge themselves within treated premises, avoiding lethal contact with sprayed surfaces, and survive the experience apparently unharmed. The implications of these observations are not in harmony with conclusions from previous work with *A. quadrimaculatus*[47, 48] or *A. gambiae*.[49] If confirmed,

* Data on the effect of modern insecticides on cockroaches, bedbugs, ants, ticks, mites, and scorpions are included even though the species mentioned are not of established significance in the transmission of human diseases. Their behavior in association with man and the proved vectorial propensities of certain related species suggests that these arthropods may have increasing public health importance—and useful information concerning their wide-scale destruction is all too meager.

TABLE 1

DDT solubility in representative solvents

Solvent	DDT Capacity (gm./100 ml. solvent at 30° C.)	Flash Point (°C.)	Specific Gravity (at 20° C.)	Color
Cyclohexanone	100–120 [51]	44° [7]	0.948 [51]	Water-white to pale yellow
Benzene	77– 83 [51]	–8° [7]	0.879 [51]	Water white
Methyl Chloride (under pressure)	60– 70 [51]			
Velsicol A R 50 Mono— and dimenthyl Napthalenes	65– 70 [51]	109° [51]	0.995 [51]	Yellow
Velsicol N R 70 Polymethylnapthalenes	approx. 65 [51]	127° [51]	1.03 [51]	Green-black
Toluene	60– 65 [51]	7° [52]	0.864 [51]	Water-white
Xylene	approx. 60 [51]	23° [52]	0.857 [51]	Water-white
Acetone	50– 66 [51]	–17° [52]	0.791 [51]	Water-white
No. 2 Fuel Oil	approx. 10 [51]			Tan
Cottonseed Oil	approx. 9 [51]			Straw
Kerosene	approx. 8 [51]			Water-white
95% Ethyl Alcohol	approx. 1.5 [51]		0.809 [51]	Water-white
Freon	less than 2 [51]			

they will occasion a basic revision of present beliefs regarding the mode of action of DDT against mosquitoes and possibly other insects.

Solvents for DDT—Much of the early application of DDT as a larvicide and as an adulticide was made with the petroleum oils as solvents. Under World War II military field conditions, this presented no great logistical problem as kerosene and fuel oil were widely distributed due to their extensive uses for other purposes. However, the solubility of DDT in these products is relatively limited (see Table 1). For economical application under civilian conditions, it was necessary to have carriers which held larger amounts of DDT per unit volume to reduce transportation and handling costs and to permit increased coverage per unit weight from airplanes, power sprayers, and even hand sprayers.

Thus, solvents were sought and tested for high DDT-dissolving capacities, coupled with such other essential qualities as high flash point to reduce fire hazards; proper physical characteristics for optimal droplet size; low toxicity to man, useful animals, and vegetation; non-corrosiveness to equipment and sprayed surfaces; freedom from inhibiting reactivity with DDT; non-repellency to insects; exemption from tendencies to bleach, stain, or to extract underlying color; and minimal residual odor or other components.

Gunther,[50] Jones, *et al.*,[51] have conducted extensive tests on more than 100 candidate solvents. They have published solubility data and have listed various physical properties of the more practical and economical solvents. In general, the DDT solvents may be classified on a strictly chemical basis as follows:

1. *Aliphatic hydrocarbons,* consisting of the crude oils and petroleum derivatives. These hold relatively small concentrations of DDT.

2. *Aromatic hydrocarbons,* chiefly velsicols, xylene, cyclohexanone, and naphthas. These are high capacity solvents.

3. *Chlorinated hydrocarbons,* exemplified by ortho-dichlorobenzene and trichloroethylene. These are more variable but in general carry large quantities of DDT.

4. *Liquefied gases,* comprising the "freons," dimethyl ether and others. These are low capacity solvents; their use frequently requires auxiliary solvents of high DDT-carrying ability.

5. *Vegetable oils,* such as sesame oil, castor oil, cottonseed oil, etc. These vary in their dissolving capacity, even among different batches; in general, they are poor solvents for DDT.

6. *Miscellaneous organic solvents,* of which alcohols, ethers, and ketones are of importance. They have variable capacities for DDT.

The relative DDT solubilities of certain solvents are shown in Table 1.

Information concerning the toxicities of the various solvents to man is far from complete. However, Calvery and Neal[53] have investigated many such diluents. They state that all of the hydrocarbon solvents present the hazard of dermatitis and possibly toxic effects due to inhalation and percutaneous absorption. The same applies to chlorinated hydrocarbons.

For the use of aqueous diluents, it is necessary to employ emulsifiers in conjunction with DDT solvents. A great variety of satisfactory commercial preparations[3–5] for this purpose is available. These products can be best integrated into special insecticidal formulations by following the technical recommendations of reliable producers or by actual test.

DDT equipment—Some progress has been made in the design of dispersal equipment for liquid insecticides. The use of stainless steel and aluminum alloys has made possible fabrication of experimental models of corrosion-resistant and lighter hand and power sprayers.[31]

Interest has continued in the application of DDT mists and thermogenerated aerosols both from powered ground equipment and from airplanes. A review of aerial insecticide dispersal has been made by outstanding authorities.[54] Exhaust aerosols from planes were used effectively in the control of anopheline mosquitoes in impounded water.[55] Airplane sprays were used for fly control.[56] Droplet patterns of the latter under varying conditions have been studied.[56]

A comparison of the distribution of liquid insecticides from an airplane equipped both with spray nozzles and an exhaust aerosol generator indicated that recovered DDT at ground level was proportionately 4 to 6 times greater for the sprays than the aerosol[57]; however, recovery from exhaust aerosol was more uniform than that from the sprays.

With the object of achieving lighter, safer, and cheaper containers for household insecticidal aerosols, new metal cans and release valves have been designed, and new propellant mixtures devised which produce efficient aerosols at gauge pressures of 24 to 35 lbs. per sq. in. at 70° F.[58] The older type aerosol containers had to be heavy enough to accommodate pressures of 70 lbs. per sq. in. at 70° F., which increases to 185 lbs. at 130° F.

DDD *

DDD (1,1-dichloro-2,2-bis(P-chlorophenyl) ethane) is a light-colored, granular solid, soluble in insecticide base oils. It is chemically stable alone, and when used in insecticidal compositions under conditions normally encountered, but incorporation or storage in highly alkaline mixtures should be avoided.[59] Attention to its insecticidal possibilities was first directed by Deonier and Jones.[60] Most of the data published have been of a preliminary nature but are sufficient to give indications as to the probable position of DDD as an insecticide against insects of public health importance.

The most promising results with DDD have been with its use as mosquito larvicides. In the laboratory, DDD has proved to be as effective or slightly better than DDT when used as a dust, suspension or fuel-oil solution against *A. quadrimaculatus* larvae.[60,61] Comparable results have been obtained experimentally under field conditions.[62] DDD has the advantage of being less toxic than DDT to fish and other aquatic wildlife.[61, 63] Herms[64] reports that DDD at a dilution of 1:20 million

* As far as is known, the Interdepartmental Committee on Pest Control has made no recommendations concerning this name. The initials *TDE*, based on "tetrachlorodiphenylethane," are considered preferable by the workers at the USDA Orlando Laboratory.[60] *Rhothan D-3* is a trade name.

was about as effective as DDT against larvae and pupae of *Culiseta incidens*.

Most workers have reported DDD as inferior to DDT in destroying adult insects. Fay, *et al.*[65] found that DDD was effective against *A. quadrimaculatus* adults under laboratory conditions but unsatisfactory against house flies. In general, it was inferior to DDT, benzene hexachloride and chlordane in residual toxicity. Similarly, under field conditions, DDD proved to be less effective than DDT or chlordane but better than chlorinated camphene.[66] Busvine[67] reported that DDD used as oil sprays or dust against lice and bedbugs was about one-third as toxic as DDT. Knipling[68] in a general report stated that DDD was less effective than DDT against various insects affecting man.

CHLORDANE *

Chlordane (1, 2, 4, 5, 6, 7, 8, 8-octachloro-4, 7-methano—3a, 4, 7, 7a-tetrahydroindane) is a chlorinated hydrocarbon having the empirical formula $C_{10}H_6Cl_8$.[69] Its insecticidal properties were first described by Kearns, Ingle, and Metcalf in 1945.[69] In the highly refined state it is a viscous, nearly odorless liquid boiling at 175° C. at 2 mm. pressure; it shows an occasional tendency to crystallize. The compound is completely soluble in the usual organic solvents such as aliphatic, aromatic, and chlorinated hydrocarbons, also in most ketones, ethers, and esters. It is completely miscible with deodorized kerosene, a solvent commonly used in insecticidal preparations, but is insoluble in water. In the presence of many alkaline reagents, chlordane reacts to form dehydrohalogenated products of a low order of toxicity to insects. It should not be formulated with chemicals having an alkaline reaction.[70]

Of the recently developed synthetic organic insecticides, chlordane is one of the more promising with respect to the control of some insects of public health importance. In both field and laboratory tests, chlordane has proved superior to DDT against the German cockroach (*Blatella germanica* L.), the American cockroach (*Periplaneta americana* L.), chigger mites, certain species of ticks such as the lone-star tick (*Amblyomma americanum* L.), and certain species of ants.[68, 69, 71–73] In laboratory tests, chlordane was found more effective than DDT against the body louse, both in duration and lower minimum toxic concentration requirements; but when impregnated in clothing, it was less resistant to laundering.[68, 72] Applied as an indoor space spray, chlordane was reported to be slightly more effective than DDT against house flies but less against *Aedes aegypti* mosquitoes.[68, 69, 72]

Under field conditions, tests have indicated that chlordane applied either as a dust or in a xylene emulsion was more effective than chlorinated camphene, benzene hexachloride or "Lethane 60" for the control of house-fly larvae in manure.[74] This substance was as effective or slightly better than DDT against larvae of *A. quadrimaculatus* mosquitoes, at the rate of 0.05 lbs. per acre in 1 gal. of fuel oil.[31] Laboratory and field tests by other workers[68, 69, 72] showed that chlordane was about equal or slightly inferior to DDT against anopheline larvae and several species of culicine larvae.

Results of both laboratory and field tests have indicated that chlordane, applied at comparable dosages as a residual spray, was generally inferior to DDT against house flies and mosquitoes.[14, 65, 66, 68, 69, 72, 75] In most tests, chlordane very nearly equalled DDT

* This name is accepted by the Interdepartmental Committee on Pest Control. The Association of Economic Entomologists and the American Chemical Society prefer "*chlordan*." It has been referred to as *1068* or as *Velsicol 1068*. The latter and *Octa-Klor* are trade names.

during the first few weeks following application, but declined much more rapidly in effectiveness. Chlordane exerts a relatively strong fumigant action against adult house flies and *A. quadrimaculatus* mosquitoes; its early effectiveness as a residual spray may be due largely to this property.[70]

BENZENE HEXACHLORIDE *

Benzene hexachloride (1, 2, 3, 4, 5, 6-hexachlorocyclohexane), with an empirical formula of $C_6H_6Cl_6$, is a complex of 5 known isomers. The gamma isomer is the principal insecticidal ingredient, the alpha and beta isomers have some toxicity, and the delta and epsilon isomers are relatively non-toxic.[76–82] The commercial form is a light buff-to-tan colored powder having a persistent musty odor arising from small amounts of manufacturing impurities. BHC is chemically stable except in the presence of alkalies. It is insoluble in water but readily soluble in a wide range of common organic solvents.

The value of BHC was first reported by Slade[83] in 1945 and later by O Kane and his associates[84] working independently. The toxic action of BHC against insects may be as a contact poison, as a stomach poison, as a fumigant, or as a combination of any of the three. The value of BHC as a fumigant has been shown against the German cockroach and other insects and the use of small amounts of this chemical allowed the content of other agents to be reduced as much as 50 per cent.[85]

When oil sprays of BHC were applied to vegetation or surfaces such as mud or plaster walls there was considerable loss of effectiveness from absorption of the toxicant. Wettable powder formulations minimized this loss considerably.[86]

Adult mosquitoes have been shown to be susceptible to BHC.[81] A kerosene solution containing 0.04 per cent gamma isomer controlled all anophelines, especially *A. culicifacies*, in India.[82] In laboratory tests with *A. quadrimaculatus* adults, 5 per cent BHC (30 per cent gamma) applied at 200 mg. per sq. ft. effected lethal results comparable to the same amount of DDT for a period of 8 weeks.[65] The residual durability of BHC is limited as the compound is lost by evaporation; increased dosage is not likely to extend its effectiveness beyond 10 weeks. BHC was equally effective against *A. minimus*, *A. vagus* and culicines in field tests.[21, 87] The paralytic action of BHC is said to be more rapid than either that of DDT or chlordane.[69] *Aedes aegypti* mosquitoes are reported[88] to have died after feeding on rabbits which received 25 mg. per kg. of gamma isomer 2 to 4 days before.*

As a mosquito larvicide, BHC at concentrations of 0.1 p.p.m. and 0.05 p.p.m. held in check larvae and pupae, respectively, of *Culiseta incidens*. In comparison, 0.5 p.p.m. solutions of DDT and DDD were effective against both larvae and pupae.[64] At 0.1 p.p.m., BHC controlled fourth-instar larvae of *A. quadrimaculatus*.[69, 89] In field tests, one application of 10 lbs. per acre of a 0.5 per cent gamma isomer dust gave complete control of *Aedes* spp. larvae.[84]

* Also known as *BHC, 666*, and, especially in British literature, as *Gammexane*, a trade name.

* Since the above was written, an article by E. F. Knipling, R. C. Bushland, S. H. Babers, G. H. Culpepper, and E. S. Raun entitled "Evaluation of Selected Insecticides and Drugs as Chemotherapeutic Agents Against External Blood-Sucking Parasites" was published in the *Journal of Parasitology* (34:55–71, 1948). The authors have tested the effect of 33 chemicals, most of them effective insecticides, administered internally to rabbits sometimes at lethal dosages, against one or more of the following ectoparasites fed subsequently on the treated rabbits: body lice *(Pediculus humanus corporis)*, yellow fever mosquitoes *(Aedes aegypti)*, ear mites *(Psoroptes equi var. cuniculi)*, and the lone star tick *(Amblyomma americanum)*. Gamma-benzene hexachloride, chlordane, chlorinated camphene, dicumarol, sabadilla seed, chloromethyl *p*-chlorophenyl sulphone, and certain of the 3-indandione compounds. Of these, benzene hexachloride was most toxic to mosquitoes and ear mites and certain of the indandiones to lice.

In cow manure infested with known numbers of house-fly larvae, 1 per cent BHC-xylene emulsion (0.1 per cent gamma) or 5 per cent BHC dust (0.5 per cent gamma) at 400 mg. BHC per sq. ft. prevented 90 per cent of flies from emerging.[74] Fifty per cent emergence of adults occurred from mash media treated with BHC at 8 p.p.m.; DDT at 77 p.p.m.; thiourea, 81 p.p.m.; and borax, 92 p.p.m., respectively.[90] LD 95 was obtained against third-instar house-fly larvae with the incorporation of 15.3 mg. of gamma isomer per liter of artificial media. Second-instar larvae were more susceptible and pupae much more resistant. BHC was non-toxic to eggs but did kill the emerging larvae.[91]

BHC has been shown to be highly toxic[81] to adult flies and, where odor is not a factor, shows promise for their control.[82, 92] The knock down with BHC is more rapid than with DDT and residual action is equally effective over a period of several weeks.[92] In laboratory tests, direct spray applications as low as 0.25 per cent BHC killed all adult flies.[84]

BHC-xylene emulsions (0.5 per cent) were highly effective against the prepupal stage of the blowfly, *Lucilia cuprina*.[93]

A 1 per cent dust applied against head lice caused complete immobilization in 20 minutes.[84] Against the body louse, BHC dust was more effective than either DDT or DDD.[67] In other tests with the body louse, 50 per cent were killed with 0.016 mg. of the gamma isomer per gm. of insect body weight as against equivalent kills with 0.30 mg. of p; p'-DDT per gm. of insect body weight.[94]

A 1 per cent solution of 10 per cent gamma BHC in fuel oil, sprayed on open fields showed good control of the American dog tick.[95] Against the lone-star tick, *Amblyomma americanum*, effective control has been obtained with a 5 per cent dust rubbed into the hair of dogs. The action was slow, 12 to 14 hours being required to kill; feeding was stopped within 2 hours.[96] Dipping cattle in a 0.5 per cent solution of 50 per cent wettable BHC (10 to 13 per cent gamma isomer) gave protection against this parasite for 7 to 10 days.[97] In oil base preparations and water suspensions, BHC at 0.005 per cent gamma isomer killed adult females of an arsenic-resistant tick, *Boophilus discoloratus*.[98]

Fleas, *Ctenocephalides canis*, were controlled in 4 hours' time with a 5 per cent BHC dust rubbed into the hair of dogs. Little or no residual action was indicated, however, as reinfestation occurred in 3 to 4 days even though an odor of BHC remained.[96]

Against the bedbug, BHC has shown a high degree of toxicity[81] and has given more effective control than several other insecticides tried, including DDD and DDT.[67]

Roaches (*Periplaneta americana*, *Blatta germanica* and *Supella supellectilium*) were controlled in 5 room houses by 250 ml. of BHC dust containing 10 per cent of the gamma isomer. They were affected in 1 hour and killed in 12 hours, but residual effectiveness was limited; the eggs of the roaches were not injured.[99] Crude dusts containing 0.5 and 1.0 per cent BHC have killed high proportions of roaches, *P. americana*, with the 1.0 per cent dust driving the roaches out of cracks.[84]

Snails of the genera *Planorbis* and *Bulinus*, intermediate hosts of *Schistosoma*, were controlled in laboratory and field tests within 24 hours by dust containing 5–6 p.p.m. of gamma BHC.[100] *

CHLORINATED CAMPHENE †

Chlorinated camphene, with the approximate empirical formula $C_{10}H_{10}Cl_8$, contains 67–69 per cent chlorine.[101, 102]

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* The authors have not confused snails with insects—but believe that this remarkable observation should be brought to the attention of public health personnel.

† Most commonly known by its trade name *Toxaphene;* also in the literature as *3956* or *Hercules 3956*.

Stearns, Parker, LeRoy, and Lynch first called attention to its insecticidal properties in 1946.[103] The solid form may be stored safely in most containers; concentrated solutions not entirely free from moisture require containers of specific materials.[102]

In space-spray tests (Peet-Grady) comparing chlorinated camphene and aerosol grade DDT with the Official Test Insecticide (pyrethrum base), both chemicals were superior to the O.T.I. against the house fly. Further tests with varying dosages and concentrations showed DDT to be better than chlorinated camphene at concentrations of less than 0.1 per cent and volumes less than 0.3 ml., but at higher concentrations and volumes, their effectiveness was equal. Since chlorinated camphene does not produce rapid knock down,[103] the inclusion of 1 to 2 per cent of a paralytic agent is advisable in space spray formulations.

As a residual toxicant, this product is reported to compare favorably with DDT; however, the tests were made under conditions of long exposure, and the number of minutes required for complete paralysis was considerably greater for chlorinated camphene. In 60-minute exposure periods, residues of 200 mg. per sq. ft. of this compound were less effective than equal deposits of DDT.[65] This relation was confirmed under field conditions.[66]

In tests against *A. quadrimaculatus*, 60-minute exposures of the adult insects to deposits of 200 mg. per sq. ft. of both DDT and chlorinated camphene gave comparable results for 8 weeks after spray application; beyond this interval, chlorinated camphene lost residual toxicity more rapidly than DDT.[65]

Used against fourth-instar larvae of *A. quadrimaculatus*,[89] chlorinated camphene gave nearly complete control at 0.01 p.p.m. in 48 hours, and at this concentration was comparable to DDT but slower in action; at lower concentrations, it was not equivalent to DDT. In laboratory and field tests with *Aedes sollicitans*,[103] chlorinated camphene compared favorably with DDT when applied at the rates of 0.2, 0.4 and 1.0 lbs. per acre.

As a fly larvicide, 1 per cent chlorinated camphene emulsions applied to manure at 100 to 200 mg. per sq. ft. were less effective than chlordane and benzene hexachloride but more effective than DDT. At 400 mg. per sq. ft., chlorinated camphene was not quite equal to chlordane and benzene hexachloride.[74] Using nymphs and adults of the bedbug as test insects with a direct spray method, 5.8 per cent chlorinated camphene was nearly comparable to DDT. As a residual toxicant, it was as effective as DDT against bedbug adults but somewhat slower in its action.[104]

The product was superior to DDT in the control of German roaches with 2.5 per cent kerosene sprays or less, and equal to DDT at 5.0 per cent strength.[104]

PIPERINE COMPOUNDS * AND PYRETHRUM

A synergist combined with an insecticide not only increases the initial effects of the insecticide by providing quicker knock down and greater kill, but often extends the duration of its residual effect. In this way, newer synergists have increased the effectiveness of pyrethrum in public health work. One of these is piperonyl cyclonene (cyclohexenone) which, because of its safety and efficiency in activating small amounts of pyrethrum, led to the study of related compounds.

Piperonyl cyclonene with pyrethrins has been used indoors with success in aerosols and household sprays in control-

* *Piperonyl cyclohexanone* (now *piperonyl cyclonene*) [105] and *piperonyl butoxide* are trade names accepted by the Insecticide Division of the Production and Marketing Administration, U. S. Department of Agriculture, for labeling purposes. They are generally used by the trade and in laboratories; they have no official endorsement.

ling mosquitoes, house flies, fleas, ants, gnats, and sandflies.[106] In laboratory tests, residual deposits of 10 mg. pyrethrins and 200 mg. piperonyl cyclonene per sq. ft. killed more than 75 per cent adult female *A. quadrimaculatus* mosquitoes during the first 23 weeks after applications. At similar concentrations, very little residual effectiveness was shown against female house flies but more effective results might be obtained at higher concentrations.[65] Success has been reported with dust combinations against roaches, body lice, and household ants.[106] The dust combinations show promise of value in murine typhus control for the reduction of rat ectoparasites but seem to lack the desired residual toxicity for this purpose, especially against rat fleas.

In comparison, combinations of piperonyl butoxide, a related synergist, and pyrethrum are especially effective against house flies but less so against mosquitoes. These combinations are likewise stable and safe to use. Dusts and wettable powders with piperonyl butoxide and pyrethrum have been reported as giving very satisfactory control of roaches, being effective for 60 days or longer.[105, 106]

EFFECTS OF CERTAIN NEW INSECTICIDES ON WILDLIFE

As long as insecticides are used only in domestic surroundings, there is no danger of creating undesirable biologic imbalances. However, when these chemicals are applied over extensive, unoccupied areas, e.g., as ground- or aerially-dispersed fogs, mists, or dusts, to kill aquatic or terrestrial insects of importance to health, forest conservation, or agriculture, serious consideration must be given to the hazard they may present to wildlife species related to the economy and happiness of man. The peril to these forms may be obvious, direct, and immediate, or it may be insidious, indirect, and delayed. The measurement of its final consequences is a time-consuming, expensive and highly specialized undertaking. The widespread area-application of insecticides and acaricides for public health purposes can be justified only by rational determination that the health values involved transcend those of all other factors contributing to man's welfare, including the preservation of useful wildlife. This was recognized in a joint statement of policy regarding the use of DDT in this country by the U. S. Army and the U. S. Public Health Service.[107]

Preliminary and later trials with DDT for the control of mosquitoes and forest and agricultural pests demonstrated that it was severely damaging to a wide variety of animal life. Cold-blooded forms such as fish, crabs, crayfish, frogs, turtles, and snakes were relatively more sensitive to its effects [108–112] than were birds and small mammals.[113–116]

In view of the early findings, a series of investigations was undertaken by several governmental research agencies at various locations throughout the country to determine the overall effects of the use of DDT and to ascertain at what dosage, if any, and in what manner and physical state, it could be used routinely without being significantly harmful to organisms of economic or recreational importance. The U. S. Fish and Wildlife Service and the Bureau of Entomology and Plant Quarantine assayed the effects of single treatments using relatively large doses. In reviewing these studies, some of which were made coöperatively, Cottam and Higgins [111] concluded that single treatments for the control of forest insects at the rate of 1 lb. per acre were not detrimental to terrestrial wildlife but that dosages of 5 lbs. per acre were dangerous. These findings may be of importance if area-wide applications are made for the reduction of arthropods of public health importance.

The U. S. Public Health Service, work-

ing in coöperation with the U. S. Fish and Wildlife Service, has confined most of its investigations to the influence of smaller applications repeated routinely. Tarzwell [63, 117] found that, while fish could withstand relatively large single doses, they were affected adversely by repeated applications of small quantities down to certain levels. Airplane sprays and aerosols at discharge rates of 0.1 lb. of DDT per acre applied over ponds each week for 2 seasons caused no significant change in plankton [118] or fish populations.[117] Similar results were reported by Hess [119] following a season's treatment of one of the Tennessee Valley Authority's reservoirs. During a single summer, this rate of application over the watered portion of a wildlife refuge in southeastern United States had no apparent effect on bird or mammal populations in adjoining areas.[120] Ground applications of DDT to watered areas of 0.05 lb. per acre repeated each week [117] were effectively larvicidal against mosquitoes and not dangerous to fish. Dusts were less toxic than oil solutions, but DDT emulsions, which kill fish at concentrations of more than 0.1 p.p.m.,[109, 110, 117] were found to be so dangerous that their use was not recommended.

Limited studies with other insecticides have shown some to be less toxic and others more toxic than DDT. Chlorinated camphene [63] is very poisonous to fish and thus is unsatisfactory as a larvicide. DDD was less toxic to fish than DDT; however, routine treatments at 0.1 lb. per acre killed fish. Chlordane was nearly as toxic as DDT and should be used at dosages less than 0.1 lb. per acre.

TOXICITY OF INSECTICIDES

With the exception of DDT, most of the insecticides discussed in this paper are so new that their limitations and their full scope of usefulness in public health practice have not yet been thoroughly investigated. There has been even less time for studying their toxicity to mammals, including man. Until comprehensive information on this subject is available, it is desirable to review data not only from public health literature but from that of agriculture and other biological sciences. This is necessary both for present safety and for the final evaluation of insecticides, which must be chosen as much for their harmlessness to man and domestic animals as for their destructive effects on insects threatening human health.

TABLE 2

Lethal Doses of the Newer Insecticides Reported by Various Authors

Compound	*Animal*	*Route*	*Formulation*	*L.D.O.*	*L.D. 50*	*L.D. 100*	*Authority*
DDT	rats	P.O.	corn oil	70	115	230	Parker and Beacher [104]
DDD	rats	P.O.			2,500		Lehman [121]
Chlordane	mice	I.V.	emulsion	30	approx. 50	70	Food & Drug [139]
	rats	P.O.			225–250		Ingle [122]
Benzene hexachloride 12% gamma	mice	P.O.			600		Furman [131]
Piperonyl	rabbits	P.O.			5,300		
butoxide	dogs and rats	P.O.			7,950–10,600		Dove [106]
Chlorinated	white rats	P.O.	kerosene	160	280	400	Parker and
camphene	white rats	P.O.	corn oil	73	120	145	Beacher [104]
	dogs	P.O.				25 or less	Food & Drug [124]

L.D.O. equals largest dose which killed none of ten or more animals. L.D. 50 equals smallest doses which killed half of ten or more animals. L.D. 100 equals smallest dose which killed all of ten or more animals. All doses are in terms of milligrams per kilogram of body weight. P.O. = Peroral; I.V. = intravenous.

It is often observed that the lethal dose of each of the newer insecticides, including DDT, varies widely for different and even for the same species of animal and by the same method of application, except intravenous administrations which show sharp dosage-mortality relationships. This suggests irregular absorption and perhaps variation in the reserve detoxifying power of the liver or other tissues as an explanation for the experimental results. However, the importance of species differences should not be underestimated. In practice, one cannot study the toxicity of an insecticide for rats and, with certainty, predict its safety for man. Furthermore, one solvent or formulation may greatly enhance the absorption and, therefore, the effective toxicity of an insecticide. Thus the same concentration of an insecticide may be absorbed more extensively when prepared in vegetable oil than in other organic solvents which are inherently more toxic. Some of these facts are illustrated in Table 2, which shows the acute lethal doses of the various insecticides discussed in this article.

Table 3, modified from Lehman,[121]

TABLE 3

A Comparison of the Acute Oral Toxicity for Rats of the Newer Insecticides with DDT [121]

Insecticide	*L.D. 50 mg./kg.*	*Ratio to DDT*
Beta Isomer, Benzene Hexachloride	6,000	1/24
DDD	25,000	1/10
Delta Isomer, Benzene Hexachloride	1,000	1/4
Alpha Isomer, Benzene Hexachloride	500	1/2
Chlordane	500	1/2
DDT	250	1
Gamma Isomer, Benzene Hexachloride	125	2

compares the acute toxicity of the various insecticides with that of DDT. There is considerable parallelism between the toxicity of the various compounds to insects and to warm-blooded animals. Thus, the least toxic compound may not be the safest since it may have to be used in higher concentration to obtain effective insecticidal action. In any event, since acute toxicity bears no relation to chronic toxicity, the acute toxicity is chiefly of value in judging the safety of a substance only for a short time after exposure.[121] It is emphasized that the chronic toxicity to man of most of the insecticides discussed in this paper is entirely unexplored.

DDT—This compound has been studied extensively from the standpoint of its toxicity, yet much remains to be learned. An excellent summary of present information based on much original work with 107 references to the literature has been made by Stammers and Whitfield.[122] They conclude that ". . . DDT when used as an insecticide, with reasonable intelligence and the precautions normal to the use of modern insecticides, is harmless to man and animals. It is, nevertheless, possible by misuse in its application, to incur risk to man and animals. The possibilities of cumulative effects from storage of DDT in milk and tissues of sheep and cattle require further investigation."

An interesting report of acute DDT poisoning in 28 men following the ingestion of a 10 per cent DDT, 90 per cent wheat flour mixture has been given by Garret.[123] The exact amount consumed was not known but some of the men must have taken several grams of DDT. Vomiting, numbness, and partial paralysis of the extremities, mild convulsions, loss of proprioception and vibratory sensation in the extremities, and hyperactive knee-jerk reflexes were the immediate toxic effects. The symptoms were transient except in the three men who had taken the largest portions.

There have been reports of several deaths alleged or intimated to be due to the ingestion or inhalation of DDT.[122, 124–126] In view of its demonstrated accomplishments in the fields of applied public health and agricultural entomology on the one hand, and, on the other, the presence of this insecticide in millions of homes and the frequent and prolonged exposure of the many individuals employed in its ap-

plication, it is of paramount importance to ascertain correctly the actual hazard to human life of DDT under normal circumstances. Thus far,[122, 127, 128] the evidence against the compound as a cause of death when used prescriptively is negligible, though instances of accidental deaths due to DDT or its accompanying diluents, adjuvants, etc., or to both, have undoubtedly occurred.

Perhaps the most complete account of a fatal poisoning involving a DDT formulation is that[124] of a 58 year old man who drank 120 ml. of a commercial preparation containing DDT, 5 per cent; "Lethane" (384 special), 2 per cent; xylene, 7 per cent; and deodorized kerosene, 86 per cent, following it with a quart of milk and several glasses of beer. The symptoms consisted of the rapid onset of epigastric pain and the vomiting of bloody material. These continued with varying intensity until death in coma on the 7th day. No urine was passed from 2 hours after ingesting the DDT until the 6th day, when the patient was catheterized. Thirty-six hours after poisoning, spastic contractures of the fingers and wrists began. The NPN on the 6th day was 150 mg. per cent. Examination on that day revealed an enlarged tender liver, unequal non-reacting pupils, and no tremor or pathologic reflexes. Autopsy findings included gastric hemorrhage, centrolobular necrosis with fatty degeneration of the remaining liver parenchyma, and tubular degeneration of the kidneys. This careful study emphasizes the danger of acute oral poisoning with insecticides. However, in view of the author's demonstration that kerosene by mouth produced in rabbits the same and only slightly less severe damage than corresponding amounts of the commercial insecticide or of 5 per cent DDT in kerosene, many readers will conclude that the diluent of the insecticides as well as the DDT contributed to the fatal outcome of this accident and that the clinical and pathologic findings were probably a composite picture of the effects of DDT and of kerosene.

Another well studied but even less convincing report[126] of a death believed to be due to DDT concerns a 47 year old man who had been working in a room sprayed with 6 per cent DDT in kerosene. Symptoms (pruritic eruption on trunk and extremities) occurred 24 hours thereafter but death did not supervene until the 57th day* after exposure! Lesions simulating periarteritis nodosa were noted at biopsy and autopsy, as a consequence of which, the authors advance the suggestion that DDT may be an allergen capable of inducing hypersensitivity. In view of the minute amount of DDT consumed, the relatively long interval between exposure and death, the initiation prior to exposure of some of the symptoms mentioned, the failure of other investigators to demonstrate experimentallly allergenic properties of DDT,[127] and the paucity of pronounced clinical or pathologic manifestations of the type commonly associated with DDT poisoning, the authors' conclusions are untenable until validated by confirmatory evidence. Pending that time, this paper is representative of a type which may occasion much harm by providing an ostensible basis for compensation claims or by interfering with the fullest utilization of a powerful agent for improving health, comfort, and economy.

DDD—This analog of DDT has been reported[121] to have a toxicity for rats (Table 2) about one-tenth that of DDT.

The pathology of chronic DDD poisoning in dogs consists of adrenal cortical atrophy and a high-grade liver damage including, chiefly, fatty degeneration and, to a lesser extent,

* The authors' summary states that "death occurred 25 days following exposure to DDT . . ." Nevertheless, the date of exposure was given earlier in the article as November 10; that of expiration, January 6.

atrophy, necrosis, and cirrhosis.[129, 130]

Benzene hexachloride—The commercial product (approximately 12 per cent gamma isomer) has been considered of rather low toxicity [131] whether given by mouth or applied to the skin of cattle and mice in excess of what would be used in agricultural practice. There is some evidence that the gamma isomer is a central nervous system stimulant while the alpha isomer is a depressant. Bushland, Radeleff, and Smith[132] found no ill effects to domestic animals from benzene hexachloride (10 per cent gamma isomer) when used every 4 days as a dip in 1.5 per cent concentration. However, 3 out of 3 cows were killed when a preparation containing 50 per cent gamma isomer was used at the same concentration and 1 out of 3 when the concentration was 0.75 per cent.

Dogs fed 10 mg. per kg. of gamma isomer daily show mild changes in the liver, bone marrow, lymphoid tissues, adrenal cortex, and cerebrum. Anatomically the lesions do not seem to account for death, and the possibility that the true cause is vascular collapse or sensitization must be considered.[134]

Dogs fed 60 mg. per kg. of alpha isomer daily show at death great emaciation, atrophy of various tissues, marked liver damage, moderate kidney damage, and lesser injury to other viscera. The alpha isomer is stored largely in the fat, liver, and adrenals.[134]

Although in single oral doses, the toxicity of the isomers of benzene hexachloride decreases in the order: gamma, alpha, delta, and beta, it has been observed in chronic toxicity experiments that the beta isomer is most toxic. The contrast is probably due to the fact that some isomers, not so readily destroyed by the tissues, are stored chiefly in tissues of high steroid content. After 12 weeks on 500 p.p.m. diets, female white rats showed the following concentrations in the fat (mg. isomer per gm. of fat): beta, 7.5; alpha, 2.4; delta, 0.5; and gamma, 0.4. There is evidence to show that the gamma isomer is destroyed in the liver and that the liver hypertrophies and presumably becomes more efficient in the task.[129]

Chlordane—This compound was shown to have marked toxicity for sheep and goats.[130–132] Chlordane wettable powder and emulsion formulations with 1.5 per cent active ingredients were used as dips at 4 day intervals, a dosage level higher than would be used in actual practice; 8 dips were given to surviving animals. Two or more of each group of 5 goats or sheep died after 3 or more dips. The principal clinical manifestations of chlordane poisoning were neurological—optic nerve or optic center impairment, ataxia, convulsions, and collapse. Animals killed by chlordane showed congestion of the brain and spinal cord, subserosal petechial hemorrhages most frequent on the antemesenteric border of the small intestine, peripheral and midzonal necrosis of the liver, and occasional variable lesions of the kidneys, stomach, and heart.

Ingle [133] found the acute and chronic toxicity of chlordane essentially the same as that of DDT for rats. The time lag between the administration of an acute lethal dose and death averaged 1 day for DDT and 4 days for chlordane. He also noted greater liver damage with DDT, greater pulmonary damage with chlordane.

Chlorinated camphene—This chemical was found to be slightly more toxic to white rats than was DDT when either was administered in corn oil.[104]

Solutions of chlorinated camphene are absorbed readily through the skin and persons handling such solutions require adequate protection.[134]

Piperine compounds—Dove [106] has given evidence establishing the remarkably low toxicity of piperonyl butoxide (see Table 2) which is recommended for use in the field, household, and food processing plants.

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Field Training Fellowships for Public Health Engineers

The Michigan Department of Health is again offering summer field training opportunities to persons desiring experience in public health engineering work. The training period is three months, during which time the students will be assigned to county health departments as assistants to the staff public health engineers.

Applications will be accepted from graduates or undergraduates of recognized professional schools with training in public health or sanitary engineering, dairy science, food technology, bacteriology, etc. Undergraduates must have completed their junior year of study. Stipends to assist with living expenses are paid by the W. K. Kellogg Foundation; the amount is approximately $150 per month. The program is approved by the Veterans Administration and veterans are eligible for the maximum subsistence allowance in addition to the stipend. Ownership of a car is desirable and car owners will receive an allowance for driving their automobiles.

For information write to Mr. John M. Hepler, Director, Bureau of Engineering, Michigan Department of Health, Lansing 4, Mich.

Is the Rh Factor a Public Health Laboratory Function?*

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WHEN the discovery of the Rh factor was announced by Landsteiner and Wiener [1] in 1940, preceded by the clinical observations of Levine and Stetson [2] in 1939, it is probable that none of these people thought that Rh factor determinations would ever be made in a public health laboratory. The hospital and research laboratory seemed the logical place for such work. The inability of most hospitals to handle this problem at that time, together with a lack of understanding of the value of the Rh factor by some pathologists, pointed to the need of a central laboratory for this work.

In 1944 [3] Dr. Theodore Graham, Chairman of the Maternal Welfare Committee of the Passaic County Medical Society, believing that one of the functions of a Board of Health is to keep down the infant and maternal death rate, proposed to Dr. Frederick P. Lee, the Health Officer, that we take up Rh determinations in our laboratories with a view to establishing an Rh-negative blood donors club. He pointed out that since ours is the only public health laboratory in Passaic County (serving communities totalling 250,000 people) we receive most of the blood specimens sent by physicians in conformity with the state law requiring a blood test for syphilis on all antepartum women.

We agreed to take over the work which was to include Rh factor determinations on specimens from the blood bank of one of our largest hospitals. This latter work would be terminated when the hospital could handle it and was terminated in 1945.

Blood grouping has been added to our work since marital incompatability of the blood groups is sometimes responsible for accidents of pregnancy and childbirth.

For the past three years we have received a total of 21,000 specimens of blood from antepartum women. We thus became, as far as we know, the first public health laboratory in the country to perform Rh tests.[4]

Our most pressing problem was securing immune serum for our work. In 1944 there was very little on the market, but we managed to obtain enough for our first tests from three different sources together with some given us by friends and a small quantity from two of our own patients. We have had but two patients whose blood possessed a high enough titer to warrant its use for anti-Rh serum and these patients were not coöperative.

Since serum continued to be scarce we decided to try comparative tests with human and animal sera, using the human serum slide test of Diamond, a test which had already been used by Tisdall [5] for large numbers of specimens and an animal serum slide test with which a good deal of experimental work had been done.* We obtained human slide

* Presented before the Laboratory Section of the American Public Health Association at the Seventy-fifth Annual Meeting in Atlantic City, N. J., October 9, 1947.

* A necessity for the slide test is a good viewing apparatus having gentle heat. One may now be obtained together with indelibly marked slides, from a firm which distributes typing serum.

testing sera from three different sources. These sera checked with the human serum tube test and possessed the advantage of being cheaper than the tube test or animal anti-Rh serum. We found that in our hands the animal serum tended to give occasional false positives. Such a case was recently noted by Pettit and Evans in a Pasadena hospital laboratory.[6]

At first most of the Rh typing serum was secured from sensitized mothers of erythroblastotic infants, but in 1945 Hill, et al.[7] prepared a serum by injecting Rh positive blood into previously immunized individuals. This serum he lyophilized. It has given excellent results in this laboratory but should be tested with known Rh sub-types before use.

Wiener [8] has recently announced that he has prepared an immune serum by immunizing normal male donors.

Comparative tests with 250 lots of human tube testing sera have taught us that no serum is perfect though the serologists responsible for the preparation of such sera do their best to make them so.

We have found that if a tube test serum begins to deteriorate it may be noted quickly by the use of a good method of reading and by testing it with a relatively large number of specimens. We follow a method suggested by Wiener [8] which makes use, not only of a macroscopic reading but also of a direct tube reading under the microscope.

We follow implicitly the method put out by the purveyor of a testing serum. We do not retitrate the serum nor do we dilute further what seems to be a strong serum.

Anti-Rh serum should not be purchased too far in advance and, of course, contaminated serum should never be used. We never use hemolyzed patients' blood for any sort of serological work.

In our opinion no one serum is safe to use without being checked by other sera. We are well aware of the fact that the busy hospital laboratory, probably understaffed and limited for time and money, will use one serum. What that serum is to be will depend upon the person in charge, his experience with the Rh factor, and the training of his technicians.

Our experience has shown us that a central laboratory is highly desirable for routine Rh testing of antepartum women. A laboratory which might test a dozen specimens of blood a week would be in no position to judge of the value of a testing serum.

We believe that the National Institute of Health has embarked on an attempt to standardize anti-Rh and blood grouping sera. This is something which is badly needed. We have received various lots of mislabeled anti-Rh sera and sera too weak to be safe to use, as well as some which were apparently incompletely absorbed.

Since we are in close touch with our obstetricians it has seemed advisable to test, not only for positivity and negativity, but also to sub-type all Rh negative women, their husbands, and children.

Agglutinins and blocking bodies are determined on all Rh-negative women. At first we used the original technique suggested by Wiener,[9] but at present we use modifications suggested by Diamond, et al.[10, 11]

All women developing these reactions are retested throughout their pregnancies at the discretion of their physicians. All such reactions, if positive, are reported by telephone and all reports are made to the physician only.

Any woman who gives a history of abortions or other accidents of pregnancy, even though she tests positive with the 85 per cent serum, is sub-typed. Only two such women have been found to be in the Rh-negative class though this particular sub-typing has only been carried on in 1947. Neither of these

TABLE 1

Detailed Comparison of the Work of Three Years on the Rh Factor

Year	Pos.	Neg	Uns.	Total	Total Exam.	* Rh Only	Blood Group	Ag. & B.B.	Pos. Ag. & B.B.	Sub-type on Men	Prime	Double Prime	Prime Double Prime	Rho Men	Rho Women	Blood Bank	Sub-Types on Pos. Women
1944 7 mo.	2,152	373	..	2,525	2,525	..	2,525	4	4	..	2	..	..	..	..	749	..
1945	4,572	912	8	5,492	7,514	89	5,484	310	8	48	38	15	..	1	..	..	..
1946	7,554	1,710	42	9,306	21,092	153	9,348	2,806	22	1,221	66	36	2	11	..	787	..
1947 6 mo.	3,379	994	5	4,378	9,740	345	4,373	834	18	403	61	28	2	8	2	..	23
Total	17,657	3,989	55	21,701	40,871	587	21,730	3,954	52	1,672	167	79	4	30	2	1,536	23

* Refers to further tests on known Rh negative women.

TABLE 2

Marital Combinations

June, 1944–June, 1947

Wife Negative Husband Positive	*Husband Negative Wife Positive*	*Both Negative*
1,036	32	206

* Both Positive	—	155
Total Women Negative	—	2,507
Total Husbands Tested	—	1,406
Total Children Tested	—	59

* Occasionally a physician will send in both the wife and husband together before the Rh factor has been determined.

TABLE 3

Infants Reported Erythroblastotic or Stillborn for Three Years

Erythroblastotic			*Stillborn*	
Rh Negative Mother Negative Rh Antibodies	*Rh Negative Mother Positive Rh Antibodies*	*Rh Positive Mother Not Tested for Rh Antibodies*	*Rh Negative Mother Negative Rh Antibodies*	*Rh Negative Mother Positive Rh Antibodies*
17 { 9 lived, 8 died	29 { 15 lived, 14 died	6 { 2 lived, 4 died	11	6

Infants Reported Normal
Rh Negative Mother —Positive Rh Antibodies
19

women had agglutinins or blocking bodies.

Out of 1,036 men sub-typed who were positive with the 85 per cent serum, 30 proved to be in the Rh-negative class.

Although this paper is not written from the clinical standpoint we feel that perhaps a few details concerning the number of erythroblastotic and stillborn infants we have had on our records might be of interest to public health laboratories engaging in this work.

A complete card index is kept of our cases and we supply physicians with cards upon which they enter facts regarding the termination of the pregnancy, condition of mother and child, and other facts of interest to us.

We occasionally issue a card to an Rh-negative woman but only with the permission of her physician. Cards are soon to be provided by the Passaic Co. Medical Society for all persons Rh tested in our laboratory.

Women on our records who have had erythroblastotic or stillborn infants are in three classes: those who are Rh-negative and have had no agglutinins or blocking bodies, those who are Rh-negative and have agglutinins or blocking bodies, or both, and those who are Rh-positive.

Of 2,507 Rh-negative women, 46 have borne erythroblastotic infants, the infant mortality with either class being about 50 per cent. Seventeen have had stillborn infants. Nineteen normal infants were born to women having agglutinins and blocking bodies.

There were 6 Rh-positive women who had erythroblastotic infants. Two of these children lived and 4 died. We were not able to explain these anomalies, although they might be due to differences in the blood groups. In one case it was not.

A family was noted, three of whose members possessed the rare Rh′ Rh″ factor. Two of these persons are women. One other person, a man, not of this family, also possessed this type.

Apparently the physicians of Passaic County are thoroughly convinced that the Rh factor is indeed a function of this particular public health laboratory. They assure us that the work we have done is very worth while. It is too early to note the effect of this work on the infant and maternal death rate.

The trend seems to be toward an increasing use of public health laboratories for Rh factor tests. Levine[12] has recently suggested the use of the public health laboratory for Rh factor determinations and we understand that several state laboratories are already doing this work.

While our work is based on the public health laboratory approach and does not touch on the transfusion problem which should very properly be left to the hospital laboratory, we are occasionally asked to do an Rh and blood grouping test in an emergency. Many hospitals still do not Rh type patients who are to receive transfusions, and transfusion reactions are still being reported.

The Rh Negative Blood Donors Club has now on its rolls more than 80 active members. All names of Rh-negative persons are sent to the Secretary of the Passaic County Medical Society who in turn contacts these persons, suggesting membership in the club.

Our work has been necessarily limited at times by the shortage of testing serum. We feel that testing for the more unusual types such as Hr, discovered by Levine in 1941,[13, 14] is best left to the research laboratory.

SUMMARY

The work of three years on the Rh factor in a public health laboratory is described.

A central Rh testing laboratory is suggested for groups of communities.

The use of human anti-Rh testing serum is preferred.

The sub-typing of Rh-negative women, their husbands, and children,

and determinations of Rh antibodies are recommended.

A successful Rh-negative blood donors club is described.

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Blood Grouping and Rh Typing in a State Public Health Laboratory*

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IN spite of the safeguard of routine cross-matching, an incorrectly typed blood is sometimes used and can damage or even kill. The free distribution of blood on a state-wide scale, therefore, involves a staggering responsibility. Realizing that blood released from the state blood bank *must* be correctly labeled, the Massachusetts program from the start has included the blood grouping and Rh typing of every unit of blood by two completely independent but cooperating laboratory units within the department. From our experience the wisdom of this course has become perfectly obvious. If there is any disagreement whatsoever in the typing of a blood it is used for fractionation products only. It is never released as whole blood, even though the discrepancy is completely liquidated upon repeat checking by the two laboratory units.

The entrance of the Massachusetts Department of Public Health Diagnostic Laboratory into a state blood typing program a year ago arose, in fact, in response to the needs of the Massachusetts blood program whose mobile units are now collecting about a thousand bloods a week—a participation in a new public health field recently well discussed by Janeway.[1] Meanwhile the Massachusetts Legislature had passed an act expanding the department's laboratory approval program to include blood grouping, Rh testing, and cross-matching, and the Diagnostic Laboratory's activities were increased accordingly to include evaluation of some 63 hospital and private laboratories within the state desiring approval for these tests. As soon as possible blood grouping and Rh typing of prenatal bloods, as requested by physicians, were added to further augment the services of the Blood Grouping Section of the State Diagnostic Laboratory. These three activities—check typing for the state mobile blood collecting units, evaluation of laboratories performing blood typing tests, and blood grouping and Rh typing of prenatal bloods—compose our state public health laboratory services in the blood typing field, and will be discussed in order in this paper. We hope later to include some research which is certainly indicated in a venture of this scope. An overall statistical summary of the Rh typings is shown in Table 1.

TABLE 1

Statistical Summary of Rh Typing During First Ten Months at Diagnostic Laboratory

Typings	*Number* *	*Per Cent*
Rh+	16,165	83.1
Rh−	3,131	16.1
Rare Rh+	146	0.8
	19,442	100.0

* Includes repeat typings on a number of individuals who returned for second and later donations. Unexplained discrepancies are excluded from this tabulation.

Dr. Louis K. Diamond has been our consultant from the beginning, and we are indebted to him for invaluable help

* Presented before the Laboratory Section of the American Public Health Association at the Seventy-fifth Annual Meeting in Atlantic City, N. J., October 9, 1947.

in the organization of this blood typing program, as well as to our own staff and the coöperating members of the Biologic Laboratories. We are grateful also to the Blood Grouping Laboratory of Boston for very generous financial assistance which has been granted to us during this formative period.

BLOOD GROUPING AND RH TYPING FOR THE MASSACHUSETTS BLOOD DISTRIBUTION PROGRAM

The two mobile bank units collect blood 5 days each week from the various communities throughout the state, roughly some thousand bloods a week. Whether this blood is ultimately distributed as whole blood or processed into fractions for distribution, it is typed both in the field and again at the central Diagnostic Laboratory. Different methods and sera are used in the two laboratories.

The blood group of each donor is determined in the field by the slide test on finger blood, using either human blood grouping sera obtained from the Blood Grouping Laboratory at the Children's Hospital in Boston, or human blood grouping globulins manufactured by the department's Biologic Laboratories after the method described by Melin.[2] At the same time, and on the same slide, the Rh factor is determined by the slide testing method of Diamond and Abelson [3]—originally proposed by them for detection of Rh antibodies—using 85 per cent (anti-Rh_o or anti-D) hyper-immune serum from the Blood Grouping Laboratory at the Children's Hospital in Boston. The reading is facilitated by the use of a portable slide viewing box, as described in Diamond and Abelson's original article. Because donor lines must move fairly rapidly in a successful bleeding clinic (slow lines discourage donor attendance), only 85 per cent (anti-Rh_o or anti-D) typing serum is used at this time. At the Diagnostic Laboratory, however, both 85 per cent (anti-Rh_o or anti-D) serum and 87 per cent (anti-Rh_o' or anti-C+D) serum are employed. The blood group and Rh factor are recorded by the field technician on a master working sheet, the results of which are not released until the blood is subsequently checked by the Diagnostic Laboratory.

The check typing by the Diagnostic Laboratory of the department is performed upon the pilot tube of clotted blood, which is collected from the donor at the time of the bleeding. Another pilot tube contains blood in acid-citrate-glucose solution, and is permanently attached to the unit of donor blood for cross-matching tests by the hospital at the time of transfusion.

Serum from the pilot tube of clotted blood is withdrawn for serological tests for syphilis by the Wassermann Laboratory, and cells are withdrawn by the Diagnostic Laboratory's Blood Grouping Section for the check blood grouping and Rh typing tests. To avoid any possible error in blood identity, the Wassermann Laboratory withdraws the serum itself from the pilot tube, and the Blood Grouping Section likewise withdraws the cells which it needs. The remaining clotted blood is left in the original pilot tube for possible recheck until all testing and retesting of the day's run is completed. We feel that these precautions are very important to eliminate divided responsibility regarding the identity of any blood, serum, or cells under testing, because the danger of confusing specimens handled by several workers can become very real indeed!

At the Diagnostic Laboratory the test tube method for blood grouping and Rh typing is used with early-immune anti-Rh serum in contrast to the slide method with hyper-immune anti-Rh serum, which is used in the field. A check typing by a different method and serum is a more substantial check than if the same method and serum were used.

Suspensions of approximately 3 per cent cells in saline are made by transferring cells from the pilot tube of clotted blood by means of applicator sticks. With a little practice the proper strength of the suspension can be judged accurately enough by its color alone. Like the field, the Diagnostic Laboratory uses blood grouping sera from the Blood Grouping Laboratory, or blood grouping globulins from our own Biologic Laboratories. Anti-Rh sera, however, are all obtained from the Blood Grouping Laboratory. The Rh factor is routinely tested with 85 per cent (anti-Rh_o or anti-D) serum, but, unlike the field, all negatives are retested in addition with 87 per cent (anti-Rh_o' or anti-C+D) serum.

The usual tube technique for blood grouping and for Rh typing is followed.[4] We have found a wooden rack convenient for holding the tubes in our routine tests. The typing sera are dropped into the tubes *before* the cell suspensions are added so that each tube can be checked to make certain the serum has actually been placed in every tube. The blood grouping preparations are allowed to remain at room temperature, while the Rh preparations are incubated for one hour in a water bath at 37° C. All tubes, both for blood grouping and Rh typing, are centrifuged at low speed for one minute before each and every reading. (Because anti-A and anti-B agglutinations are more easily read after centrifugation, and an occasional weak agglutination will be missed without it, we spin at low speed all the blood grouping tests as well as the Rh typing preparations.) By having an extra set of centrifuge carriers, loading and unloading of a set of tubes in the carriers can conveniently be performed during the otherwise wasted minute while a second set is spinning in the centrifuge. All tubes are read macroscopically by at least two independent workers, and all macroscopic negatives re-read microscopically. When completed, the results of the run are compared with the results of the field typing. If there are any discrepancies, the blood units involved are excluded from distribution as whole blood, and are fractionated instead, even though the discrepancy is liquidated on the repeat tests always performed by the central and field laboratory units. This procedure is followed to save time, and to avoid all possible chances of error.

Bloods which show macroscopic or microscopic agglutination with 85 per cent (anti-Rh_o or anti-D) serum are labeled as "Rh positive" and so recorded on the card mailed to the donor, and bloods which are negative macroscopically and microscopically with 87 per cent as well as 85 per cent serum are labeled and recorded as "Rh negative." Bloods which are negative with 85 per cent (anti-Rh_o or anti-D) serum, but positive with 87 per cent (anti-Rh_o' or anti-C+D) serum are labeled as "rare Rh positive sub-group," and the card mailed to the donor is stamped with the following words:

RARE RH+ SUB-GROUP
DONATE TO RH+ ONLY
RECEIVE FROM RH− ONLY

There has been so much confusion even among physicians about the significance of the Rh sub-types that it seemed wise to include the explanatory phrase. Although a blood which is negative with 85 per cent serum and positive with 87 per cent serum is nearly always an Rh′ (Cde), we have used the phrase "rare Rh+ sub-group" as academically more accurate, because without 30 per cent (anti-Rh″ or anti-E) serum it is impossible to exclude the rare occurrence of an Rh′″ (Rh′ Rh″) blood. Anti-Rh″ (anti-E) serum would be difficult to obtain in the amounts necessary for the volume of Rh typing which we are routinely performing. Furthermore, the likelihood of sensitization to the Rh″

(E) factor by transfusion alone is too remote to be of practical consideration in routine blood typing, since the incidence of the Rh″ sub-type is less than 0.2 per cent and it has been shown to be a very weak antigen.[5, 6] We therefore do not use 30 per cent (anti-Rh″ or anti-E) serum in our large-scale routine blood-typing program. To avoid any secretarial errors in copying, all reports are stamped and checked by the participating laboratory workers themselves.

INVESTIGATION OF DISCREPANCIES

The importance of a thorough study of each disagreement between the field and central laboratory was realized at the outset, and the studies have been almost as enlightening as the discrepancies have been annoying. Of the 16,210 bloods typed by the field unit and central laboratory, there have been 63 disagreements on the blood grouping, and 140 disagreements on the Rh factor.

Where disagreement occurred between the field technician and the Diagnostic Laboratory, a complicated series of recheck typings is performed by the Diagnostic Laboratory. The blood is then resubmitted to the field technician for a second typing. This recheck is entirely independent, since the technician does not then know the findings of the Diagnostic Laboratory, nor can she possibly recall her original report on the blood some days before.

All 50 of the completely studied blood group or ABO discrepancies have been liquidated by agreement of the two laboratory units upon rechecking. In contradistinction to some of the discrepancies in Rh typing, they were all caused by human errors in performance or reading; none was the result of aberrant factors in the blood or typing sera.

Our form provides for a similarly involved series of rechecks by the Diagnostic Laboratory, followed by the field technician's independent recheck. As in the ABO discrepancy studies, the Diagnostic Laboratory has rechecked the Rh factor by both the tube and slide methods, and in the slide method has used both its regular lot of serum, and serum of the same lot number used in the field, to learn whether the discrepancy is caused by a difference in the typing sera, or by a human error in performance. It will be noted that disagreement here between field and Diagnostic Laboratory is more apparent than real, for the Diagnostic Laboratory agreed with the field technician when it used the slide test and the same lot of serum. It is essentially a discrepancy between sera rather than between laboratories. Interesting and disturbing variations, which occurred during a period when the "cfx" lot of serum was used, are now under investigation by a colleague. Studies so far suggest that they may be explained by this reagent containing also a rare variant of the anti-Rh_o serum.[7] If this further study should add new knowledge about immunity to the Rh factor, such knowledge has been made possible only by the existence of two independently operating laboratory units where every discrepancy is subjected to thorough investigation.

Unfortunately, since anti-Rh agglutinins are not a normal constituent of human serum, we cannot employ a procedure comparable to the "reverse typing" so useful for checking blood groups, in which the unknown serum is tested against known A and B cells. However, in addition to the regular tests, we recheck all bloods with the albumin technique.[8] We have lately at times included tube-testing with hyper-immune serum with the cells under test suspended in the donor's own serum, when results have been otherwise equivocal.

One hundred and eleven of the 140 Rh discrepancies were completely studied. Seventy-five were explained by a reversal of the field technician's original findings upon recheck; 13 were liquidated upon reversal of the Diagnostic

Laboratory's first findings; and 23 remain unexplained.

As a direct result of the several disagreements where an Rh-positive slide test was read in the field, but a negative reading was made at the Diagnostic Laboratory—some explained and some unexplained—we now include slide tests on all prenatal bloods which are Rh-negative by the routine tube test at the Diagnostic Laboratory.

Uncomfortable and crowded quarters, and congestion of donors during certain hours of the day are unsatisfactory working conditions, which have been very difficult to avoid in a mobile clinic, which must accept facilities as they find them. In addition, fatigue from constant repetition of a single task, rare clerical errors, and simple technical inadequacy in performing the tests have all contributed to the mistakes in the field. A number of the errors were due to a single inadequately trained laboratory worker, whose technique greatly improved after further tutelage at the central laboratory. The inexperienced may confuse rouleaux formation in the slide test with true agglutination. At times during the warm weather coagulation seemed to take place before anti-A or anti-B agglutination could occur. For this reason heparin is now to be added to the anti-A and anti-B typing sera. It is already used in the anti-Rh slide typing sera, where it successfully combats coagulation.

We are skeptical of laboratories which report no difficulty at all in their Rh typing. Unless their work is checked on a large scale by a second independent laboratory unit, they are not likely to learn of their occasional mistakes. You cannot have discrepancies if you do not have another laboratory with which to be discrepant! We should therefore welcome discussion from representatives of blood typing laboratories, which have conducted large-scale Rh typing programs in parallel with other laboratory units, especially if the other laboratory unit employs a different method and different serum.

EVALUATION OF LABORATORIES PERFORMING BLOOD GROUPING, RH TESTING, AND CROSS-MATCHING

Strong indication that local hospitals are committing unsuspected errors from time to time, especially in their Rh testing, is shown by their results on our series of unknown bloods which were sent for evaluation of laboratories desiring approval for blood grouping, Rh testing, and cross-matching under the department's laboratory approval program. Samples of bank blood preserved in acid-citrate-glucose solution were sent to 63 laboratories for blood grouping, for Rh testing, and for use in special cross-matching problems. The results of the blood grouping and Rh typing tests are tabulated in Table 2.

TABLE 2

Statistical Summary of Results of Test Specimens Submitted to Laboratories for Evaluation

	Total Specimens Tested *	*Errors in Blood Grouping*	*Errors in Rh Typing*
Series I	777	8	61
Series II	502	6	34
Series III	211	0	5
	1,490	14	100

* Obtained by multiplying the number of bloods tested by each laboratory by the number of participating laboratories.

As would be expected, there were many more errors in Rh typing than in blood grouping. The 100 Rh typing errors out of 1,490 blood specimens are about 7 per cent—an uncomfortably high percentage of inaccuracies. Actually 23 laboratories performed perfect or nearly perfect typing, while 69 of the 100 Rh errors were committed by just 13 laboratories. Some of them were due to inadequate typing serum, including serum of animal origin, but many were due to poor training and inade-

quate supervision of technicians in this important procedure. While Rh typing tests are easy to perform correctly, they are likewise easy to perform incorrectly. A number of laboratory workers have assumed that they must be doing the Rh work accurately, because they "get about the right number of positives." Certainly occasional errors will hardly be detected by such casual means, and a laboratory's degree of accuracy can be established only by careful evaluation studies, or by an extended performance in parallel with another laboratory. A strong plea is made for more adequate supervision and appraisal of laboratories performing blood grouping, Rh typing, and cross-matching tests.

BLOOD GROUPING AND RH TYPING OF PRENATAL BLOODS

The typing of prenatal bloods upon request is the third activity which the Blood Grouping Section now performs. Its justification as a public health laboratory procedure stems partly from the lack of convenient typing services in certain more rural communities, and partly from its unreliability in some other communities. But because the law requires a blood specimen for a serological test for syphilis at the first visit of an expectant mother to her physician, and because the specimen which is collected for a serological test may be used also for blood typing tests, the great convenience of the state service to both doctor and patient is perhaps the reason most attractive to the many physicians who have welcomed the service. The discomfort and inconvenience of a second venipuncture is avoided: the physician needs only to fill out the necessary additional forms.

The clotted blood specimens received at the Diagnostic Laboratory containing requests for prenatal tests are treated exactly as already described for the pilot tubes received from the mobile blood units. The Wassermann Laboratory draws off the serum which it needs for the tests for syphilis, and the Diagnostic Laboratory Blood Grouping Section makes a cell suspension for its tube test from the clotted blood remaining in the specimen tube. Although the physician is primarily interested in the Rh factor rather than the blood group, it is administratively convenient for us to include blood grouping on prenatal bloods exactly as on bank bloods. Bloods which are negative by the 85 per cent (anti-Rh_o or anti-D) serum are tested with 87 per cent (anti-Rh_o' or anti-C+D) serum, and the Rh report is stamped as POSITIVE, NEGATIVE, or RARE Rh+ SUB-GROUP, as the results of the tests indicate.

For an Rh-negative patient, the following instruction to the physician is stamped on the report:

> IMPORTANT—Since patient is Rh-negative, submit husband's blood for Rh testing—use enclosed forms.

For a patient belonging to a rare Rh positive sub-group, this slightly different wording is used:

> IMPORTANT—Since patient belongs to rare Rh positive sub-group, submit husband's blood for Rh testing—use enclosed forms.

The forms which are sent to the doctor for use in submitting the husband's blood include the following note:

> NOTE: Pregnant patients, whose bloods are Rh negative or belong to a rare Rh positive sub-group, and whose husbands are Rh positive, should have blood sera titrated for *antibody content*, especially multiparous patients, and patients with a history of previous transfusions, late miscarriages, jaundiced or anemic babies, or other evidence of Rh sensitization. Such titrations of antibody content should be performed at a qualified private laboratory; the Department of Public Health is not prepared to perform such service.
>
> In case of transfusion, patients whose bloods are Rh negative, or belong to a rare Rh positive sub-group, should receive only Rh negative blood.

Much confusion about the Rh factor has arisen apparently in the minds of some physicians as well as the laity, even to the point of belief that any Rh-negative mother cannot or should not become pregnant. At the suggestion of Dr. Diamond we prepared an informative flier entitled "The Rh Factor and Pregnancy," which we enclose whenever a negative or rare Rh-positive subgroup report is sent to the physician. We have seen fit, further, to supply the waiting rooms of the bleeding clinics with this flier, for the wording is not too technical for lay consumption, and reassurance is needed for the mild hysteria which has been aroused among the general public.

Without publicity upon our part beyond the original announcements, the service is growing. The first full month we typed a modest 138 prenatal bloods. A half year later we now handle weekly some three hundred prenatal bloods sent to the laboratory for the Wassermann and blood typing tests, in addition to a thousand-odd bloods received from the mobile bank units. Apparently the great importance and convenience of the service meet a definite need of the physicians of the Commonwealth.

While most of the discrepancies in the typing of the bloods collected by the state blood program were the result of mistakes made in the field, where precision is more difficult, rather than by the Diagnostic Laboratory, we are still a little uneasy that the prenatal bloods done by the Diagnostic Laboratory do not have a second typing by an independent laboratory unit. For this reason, we now include Rh slide tests on all prenatal bloods which give an Rh-negative or rare Rh-positive tube test. Although statistical analysis made possible by our discrepancy studies implies an accuracy of at least 99.8 per cent for the Diagnostic Laboratory, by the operation of an independent second laboratory unit also testing prenatal bloods, we could be sure of still greater accuracy.

SUMMARY

The Massachusetts Department of Public Health is engaged in a large-scale blood grouping and Rh typing program. This program arose in response to the needs of the state blood bank, which now collects some thousand bloods each week. All donors are typed in the field by the slide method, and a pilot tube of clotted blood is rechecked independently at the Diagnostic Laboratory by the tube method. The occurrence of discrepancies from time to time, especially in Rh typing, is eloquent evidence of the value of this double checking in any blood grouping and Rh typing program, and enlightening information has been gained by complete investigations of all disagreements.

In addition the department evaluates laboratories in the state desiring approval for blood grouping, Rh typing, and cross-matching. The results of unknown bloods sent to participating laboratories in several series reveal an uncomfortably high percentage of errors, particularly in Rh testing. Since errors in typing and cross-matching can cause disasters, the great need for more adequate supervision of laboratories performing blood typing tests is therefore stressed.

The program includes also blood grouping and Rh typing of prenatal bloods, as requested by physicians, and the test is conveniently performed upon the same specimen submitted for the required prenatal test for syphilis. The service is valuable as a state public health activity, and the volume of the work is growing. It is hoped that disastrous results, which have previously occurred when Rh-positive blood has been given to pregnant Rh-negative women, will be prevented by this program, as well as more intelligent management of mother and child made possible.

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ADDENDUM

Since the presentation of this paper we have discontinued the use of early-immune serum in the tube test and now employ a modification of the test described by Wiener and Hurst (*Exper. Med. & Surg.*, 5:284, 1947) using testing serum high in blocking antibodies (hyper-immune serum) with 25 per cent human albumin (20 per cent bovine albumin is equally satisfactory). Early-immune sera are fragile, but hyper-immune sera are more stable, are more easily obtained, and may be used conveniently either in the tube (with albumin) or on the slide.

The Production and Proper Use of Rh Typing Reagents*

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A SHORT time after its discovery in 1941, it became evident that the new Rh blood type was of clinical importance in transfusion of the Rh-negative individual—man, woman, or child—and sometimes in the pregnancy of an Rh-negative woman. It therefore became desirable to carry out Rh typing both on the recipient and on the donor of the blood transfusion and on prenatal specimens from obstretical patients. From the onset, there was difficulty in procuring a suitable Rh typing reagent and in obtaining clear-cut agglutination with it. Animal sera were found to give results which were often difficult for the beginner to interpret correctly. Human sera were more satisfactory, but obtaining them depended almost entirely on identifying Rh-negative women sensitized through pregnancy with Rh-positive infants, and such patients are relatively scarce. In addition, it was found that these sera were not always sufficiently high-titered to give clear-cut results. What was even more puzzling, many such women produced sera which failed to agglutinate Rh-positive cells suspended in saline solution. It became necessary, therefore, to investigate the reasons for such difficulties in technique and to learn and describe proper methods of Rh typing using the sera available at the time and thereafter. It was even more important to produce large amounts of Rh typing reagent, particularly during the war when the armed forces required such serum in performing whole blood transfusion as an emergency as well as a standard therapeutic measure.

In 1943, under a contract from the Office of Scientific Research and Development of the National Research Council, these problems were undertaken by our laboratory, and in the last two years the work has been continued with support in part from the U. S. Public Health Service.

The sensitization of an Rh-negative individual to the Rh factor, either through blood injection or through pregnancy, in the case of the woman who bears Rh-positive children, results in two types of antibody. First, an agglutinin that acts on red blood cells suspended in saline as well as in natural media (plasma and serum). Then with continued pregnancies or sensitization through large transfusions or multiple transfusions, the production of an antibody which fails to act on saline-suspended red cells but agglutinates, with varying speed, Rh-positive cells suspended in plasma, serum, or fractions of these, of which the most satisfactory has been albumin. We have called the first the early-immune antibody, the second the hyper-immune antibody.

The standard techniques can be described under the following terms: (1)

* This study was supported in part by a research grant from the U. S. Public Health Service.

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slide test, using either oxalated blood or finger blood, (2) tube incubation test, (3) capillary tube test (Chown). These are illustrated in Chart 1.

The tube incubation test was the first used and the most successful, according to the original method of Levine and of Landsteiner and Wiener. Using the weak animal sera and the relatively weak human sera available in 1941, this was the necessary technique for such testing, since 37° C. incubation for an hour and then centrifugation was the only certain method of producing agglutination of Rh-positive cells by these somewhat impotent antibodies. In subsequent years, as more and more powerful human sera became available, the length of time of incubation could be shortened, and most recently most sera will produce agglutination within 10 or 15 minutes, even without incubation.

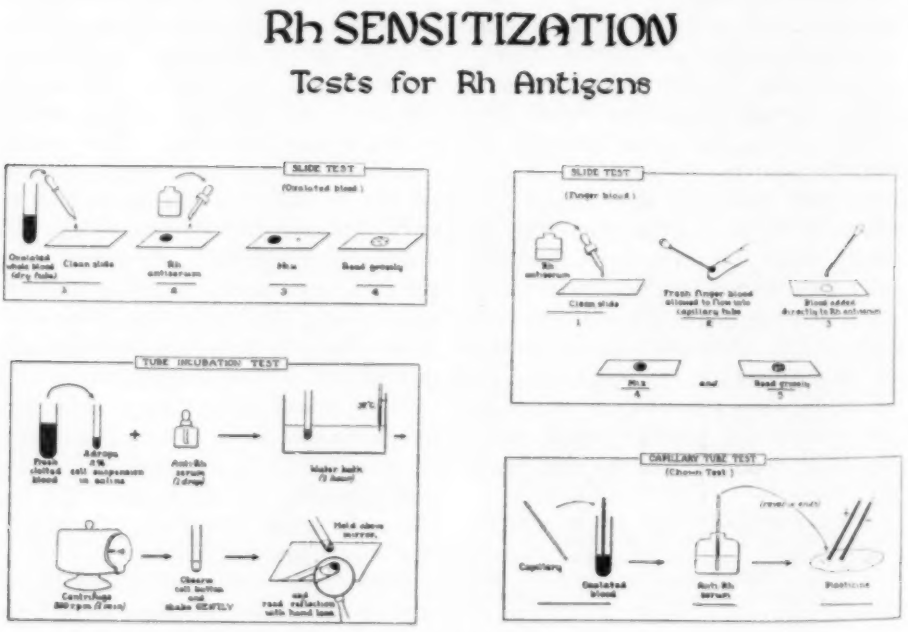
The capillary tube test, as developed by Chown, was most satisfactory in that it permitted incubation for ½ hour or more in a very narrow tube and was particularly saving of serum. Instead of 20 tests possible from one ml. of serum, the Chown capillary tube method permits about 100. It also is fairly easy to read and does not require equipment of the expensive variety such as water baths or centrifuges.

The slide test method, using either oxalated whole blood or blood taken directly from a finger prick, is done relatively easily and most rapidly if the serum is sufficiently potent and avid to give macroscopic agglutination of Rh-positive blood within 2 to 3 minutes.

The slide test technique has been the most satisfactory in most instances, because of its speed and ease of reading even for the inexperienced technician. In addition, slide testing serum is more abundant and more stable.

Some of the errors that have made Rh typing unreliable are, first, the use of weak sera obtained either from animal or human sources, which fail to produce agglutination of Rh-positive cells even when fresh, without prolonged incuba-

FIGURE 1



tion. Too vigorous shaking of the clumped cells after standing or after centrifugation, with such weak sera, often breaks up the clumps into such small masses that they are not visible macroscopically or may be overlooked even microscopically because of the small agglutinates. It is important, therefore, to have a potent serum and not to shake the tube too vigorously before reading. The next error results from the use of a hyper-immune or "blocking" serum or a serum containing both the hyper-immune and the early immune types, which will fail to give satisfactory agglutination of saline-suspended red cells. In general, it is always safer to use red cells suspended in their own serum or in plasma or, if obtainable, in albumin, and perform these tests with potent serum using either a 2 per cent concentration of cells for test tube tests or a 40–50 per cent suspension of cells for the slide test. In the use of the slide test, it is advisable to have an Rh-negative control specimen since too long a period of observation, particularly with a slow serum, may lead to drying and rouleaux formation that is mistaken for positive agglutination. One should read as positive only the cells that show clear-cut, gross agglutination, within 3 minutes or less, before the slide preparation has begun to dry.

Another important consideration in the proper use of Rh typing reagents is the knowledge that individuals having the rare sub-types Rh′ or Rh″ (in the English nomenclature, C and E) are just as likely to develop sensitization to the common Rh blood type, Rh_o (or in the English nomenclature, D), as are Rh-negative persons. For transfusion purposes, therefore, it is important to test the recipients of blood and women undergoing prenatal tests with an anti-Rh_o or anti-D or so-called "standard" Rh typing reagent. Anyone negative to this reagent is susceptible of sensitization to this common factor which is present in 85 per cent of the white population.

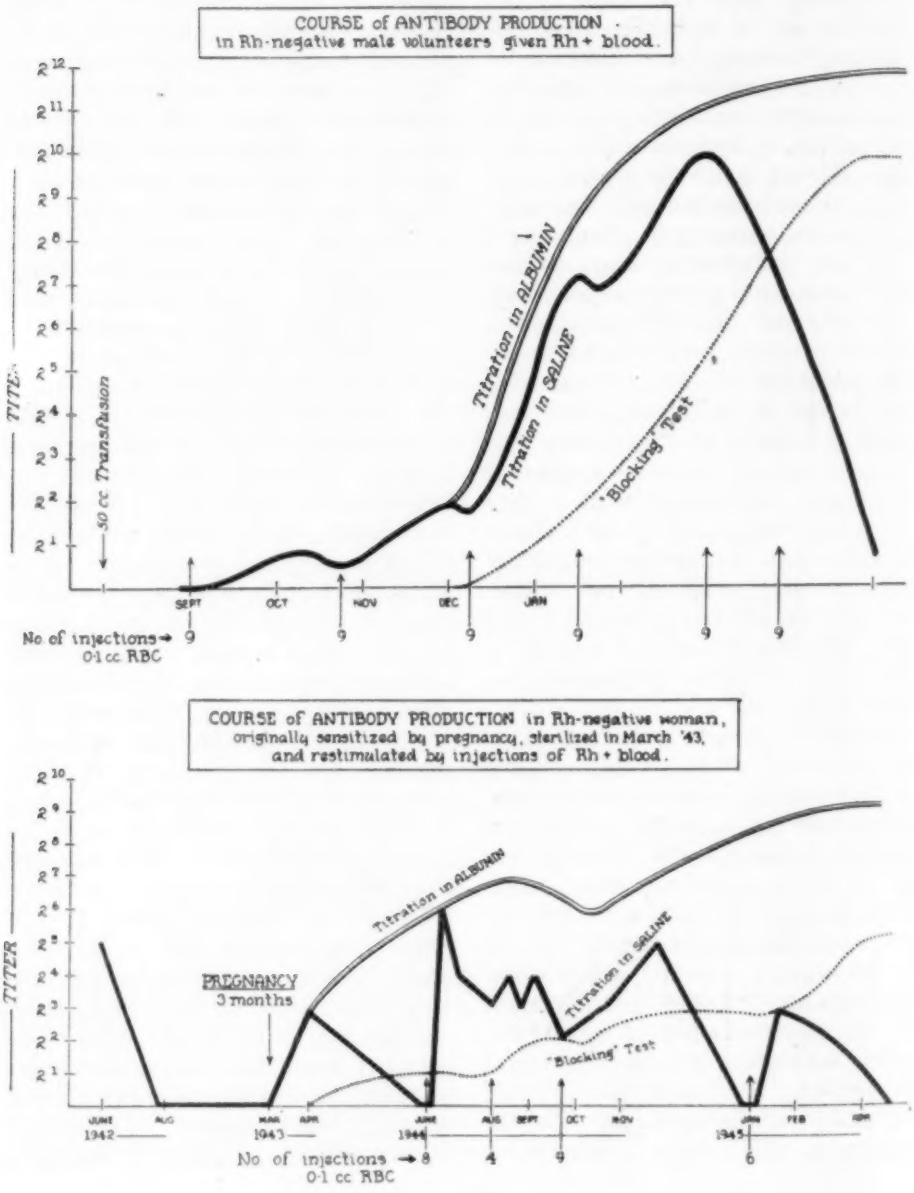
Although it is difficult to sensitize an Rh_o individual who lacks the Rh′ or Rh″ sub-types to these rare types (and statistically the chances of doing so are very small), such a difficulty may become important in the women with obstetrical complications. For this reason it has become the practice in many hospitals and blood banks to use an 87 per cent serum, or if possible all three Rh typing reagents on donors of blood transfusions and on the husbands of Rh-negative women. Since a serum containing the anti-C and anti-D factors (the 87 per cent serum) is much more common and more easily obtainable, whereas the Rh″ or E factor is relatively rare (<0.2 per cent), the anti-C and D serum has become the standard for use in blood banks on donors' blood specimens. In an effort to determine the need for such a routine, several thousand cases of Rh sensitization were reviewed. In no case was there any evidence that the injection of a C-positive or E-positive blood sample without the D factor produced sensitization in an Rh-negative individual. On the other hand, any number of cases were encountered in which because an 87 per cent serum had been used and a person identified as Rh-positive when actually she (in most cases this occurred in women patients) was negative to the D factor —the most common and most important of these—Rh sensitization occurred because such a D-negative person was then given Rh-positive blood containing the D factor. It therefore seems, from a practical standpoint, that it would be much wiser to use only an 85 per cent anti-D serum in all obstetrical clinics and possibly in all blood banks. This does not mean that the more inclusive sera, and in fact several different sera, having specificities anti-C, anti-D, anti-E, and anti-c and others if available,

should not be stored and used on special investigative problems in a laboratory equipped both by experience and by trained personnel to carry out such tests.

As to the production of Rh typing reagents, three sources of human serum are available. First, the accidentally immunized man or woman who has a high-titered serum (in the case of the latter pregnancy being the most common cause for such sensitization); second, the woman who has been sensitized but has low titered antibodies but can be re-

FIGURE 2

Rh SENSITIZATION



stimulated to the production of more potent agglutinins; and third, volunteers, of proper blood type (chiefly Rh-negative, although Rh′ and Rh″ subjects can also be used) who may be stimulated through injection of Rh-positive blood.

Because of our contact with large obstetrical services (the Blood Grouping Laboratory receives specimens from several hospitals having a combined delivery rate of about 15,000 babies per year), we have been fortunate in being able to obtain fairly frequent contributions from women who have had infants with erythroblastosis fetalis and have high-titered agglutinins at the end of gestation or shortly thereafter. Unfortunately, many of these women are handicapped by anemia, or debility following childbirth, or a combination of these factors, so that not too much blood may be taken at one time. More disturbing is the rather rapid fall in anti-Rh titer which tends to occur in most women within a few months after the end of gestation so that their blood does not remain valuable for too long a time.

It is therefore desirable to have a large panel of donors, either women * restimulated by suitable injections of Rh-positive blood or male subjects initially stimulated and later restimulated so that the useful Rh reagent may be obtained frequently and in sufficient volume.

Our method of stimulation is shown in Chart 2. The first represents the stimulation of volunteer Rh-negative male donors, the second of a female donor originally sensitized through three pregnancies.

An initial stimulation can be produced by as little as 50 ml. of whole blood given intravenously. Intramuscular or subcutaneous blood has not proved satisfactory.

The use of a cell-free Rh antigen would be ideal, but to date no uniformly satisfactory free source has been discovered by the many workers in this field, and therefore fresh Rh-positive cells remain the only satisfactory stimulus. They may be given in very minute amounts, to properly sensitized individuals, that is, as little as 0.1 to 0.2 ml. of blood. Larger amounts may be satisfactory, but we have observed disturbing chills, headache, pain in the back, and even fever in highly sensitized individuals from as little as 1 ml. of whole blood injected intravenously.

The production of the rarer typing sera, such as pure anti-Rh′ (anti-C) and anti-Rh″ (anti-E) and the anti-Hr sera, has not been satisfactory to date, and as the source of these we are still dependent upon the identification of women sensitized by pregnancy with the specific incompatible factor. Here, again, we have been fortunate so that we have available fairly large amounts of the four most useful sera and very small amounts of the two remaining very rare sera.

As to the stabilization of the Rh typing reagents, which tend to deteriorate rapidly *in vitro*, it is obvious that bacterial contamination must be carefully avoided. Unfortunately, the usual bacteriostatic or antibacterial agents, such as acroflavin, the mercurials, and various dyes, cause relatively rapid deterioration of the Rh typing reagent. The early-immune or saline agglutinins are more easily affected than the hyper-immune or albumin forms. It has been necessary, therefore, to avoid such bacteriostatic agents in Rh serum. Refrigeration is necessary for the saline agglutinins though not so important for the hyper-immune forms which are heat-stabile. The latter can often be kept at room temperature for long periods without much loss of potency.

Finally, it has been an unfortunate practice in many laboratories dispensing

* All such women, subjected to restimulation, should be either beyond the childbearing age or have been sterilized for reasons of health, to avoid harm to future gestations.

these reagents, to dilute them as much as possible, in a natural desire to make a small amount of potent material go as far as possible. This has increased the rate of deterioration almost in direct proportion to the amount of dilution.

As shown in 1944 by Cameron and Diamond, the addition of plasma or serum or, still better, albumin, not only improves the avidity and titer of Rh typing reagents and probably other blood grouping sera, but also stabilizes them by reducing the rate of deterioration. It has become our practice, therefore, to add albumin to all such reagents. This material is preferable to serum and plasma because both of the latter may cause disturbing rouleaux formation, which is not found when albumin is used. A mixture of albumin and serum in the proportion roughly of about 1:1 may help conserve the rather expensive fraction of blood. However, it is important in such instances to use only AB serum or plasma. Bovine albumin is cheaper and just as satisfactory as human albumin.

By the addition of bovine albumin, sera with high titers may be diluted to conserve the reagent and yet avoid rapid deterioration through lowering of the protein content.

Our present method of preparing these Rh reagents is to stimulate the production of high-titered anti-Rh serum by proper injection of Rh-positive cells into Rh-negative sensitized men or women. After bleeding at the most suitable time (often with replacement transfusion in order to prevent depletion of the donor, and allow re-bleeding sooner), the serum is separated sterilely. Quite often, additional Rh typing reagent can be obtained by washing the clot with saline or with a saline and albumin mixture, and allowing settling for 24 hours in the refrigerator. Such sera are then titrated and diluted or fortified to the titer and avidity recently advised by the National Institute of Health. Thirty per cent bovine albumin is added to the serum during the final dilution, so that the end product has an albumin content of no less than 20 per cent. This permits not only better storage and diminished rate of deterioration, but may increase the avidity of the reagent. The serum may then be stored at 4° C., although refrigeration at —10° and lyophilization or drying in vacuum may be a better method of preservation. To date, we have used only storage at ordinary refrigerator temperature (4° C.) and the sera have shown satisfactory activity many months after first production.

One additional important step is the neutralization of the natural anti-A and/or anti-B isoagglutinin if the donor belongs to Group O, A, or B. This often presents a real problem. To date, we have used chiefly Witebsky's AB substances as prepared first by Eli Lilly and Company and more recently by Sharp and Dohme Laboratories. Proper preparation of saliva from secretor individuals of the proper group may also give suitable AB soluble substances to neutralize such sera. Finally, blood cells themselves may be used, as for example, Group A cells added to the Rh serum of a Group B individual until neutralization of all the anti-B isoagglutinins has been achieved. This is a more difficult and troublesome procedure than the addition of the soluble substances. Complete neutralization must be verified by control tests with Group A and Group B, Rh-negative cells, and such tests must be repeated at frequent intervals, since neutralization does not always seem to be a stable process, particularly where the AB soluble substances have been so used.

DISCUSSION AND SUMMARY

1. In the past five years Rh typing has been recognized as an important and a practical laboratory test. The Blood Grouping Laboratory of Boston has grown at a phenomenal rate since its formation in 1942. Similar labo-

ratories, in hospitals, under the sponsorship of city, county, or state medical groups have been organized all over the country. In fact, it has become an accepted public health responsibility in many states to type all women prenatally, in an effort to protect the Rh-negative individuals from sensitization to the Rh factor, should blood transfusion be necessary during pregnancy or in the puerperium. Certainly such protection, so easily performed, by typing specimens referred to the state laboratory for routine and required serological test of prenatal patients, offers great protection to the individual. In addition, the Rh-negative woman, being so identified, may be watched more carefully by her obstretician and with suitable testing of the husband and of the patient's blood, particularly in the second or later pregnancy, earlier detection of Rh antibodies may help avoid some of the catastrophes occurring at term to infants with erythroblastosis fetalis. Finally, since large numbers of men, women, and children at some time or other have a serologic test performed in state laboratories, would it not be a simple and protective measure to carry out blood grouping and Rh typing on all such specimens? Through this, the individual, knowing his or her own blood type and Rh factor may help the physician to avoid improper transfusion or blood injection which in so many instances has led to serious transfusion accidents, and in pregnancy cases, to serious harm to infants of sensitized mothers. For all these purposes, the proper use and the increased production of Rh typing reagents are a necessity. Further work is necessary in order to offer the fullest protection to everyone.

2. The proper use of anti-Rh sera requires that the tests be performed on relatively fresh cells, that certain precautions in technique be observed, that sera for test tube testing on saline-suspended red cells be recognized as different from sera containing the hyper-immune component acting only on cells suspended in plasma, serum, or other protein media, such as albumin. The slide test has proved one of the most satisfactory and most rapid methods of Rh typing. To avoid errors it is advisable that controls be set up, such as known Rh-positive and Rh-negative cells, which can be tested in the laboratory at regular intervals. Under these circumstances, a minimum of errors may be expected.

3. Rh typing reagents, particularly of the standard types, that is, anti-D and anti-C + D, can be obtained from recipients of blood transfusion and from women who have been sensitized through pregnancy. They can be produced in larger quantities by immunizing experimental subjects and by restimulating men and women accidently sensitized. This is done by injection of the right type and the right amount of Rh-positive blood at suitable intervals. Such sera must then be carefully neutralized to remove their normal isohemagglutinins, diluted to the proper point for required avidity and titer, and stabilized by the use of plasma, serum, or, still better, albumin. For the latter purpose, bovine albumin has been found most satisfactory and cheapest.

Human Waste Disposal from Railroad Passenger Cars*

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THE distinguished Professor William T. Sedgwick said in an address[1] before the New England Railroad Club in Boston on November 14, 1899:

> I have felt for a good while that we must have . . . some better method of taking care of the excrement . . . of people who are traveling by rail. . . . the present arrangement is unsanitary . . . . . I confess that I do not today see a . . . practicable remedy. . . . but I believe that the scattering of germs . . . is a serious thing, and sooner or later it has got to be stopped.

At this same meeting, Dr. Samuel H. Durgin,[2] a past President of the American Public Health Association and at that time Chairman of the Boston Board of Health, remarked that the A.P.H.A. had appointed a committee to submit the best and latest notions for railroad car sanitation to the Association for transmittal to the railroad managements.

Dr. Kenneth F. Maxcy, in a recent report,[3] discloses that in 1903 Dr. P. B. Barringer of Charlottesville, Va., in a paper[4] presented before the Virginia Medical Society meeting, expressed the opinion that infected roadbeds were an unsuspected source in the spread of typhoid fever. He estimated that there were over 370 cases of typhoid traveling over each mile of road in the United States each year. On this basis he believed that the old roadbeds were permanently infected because the cool moist soil under the ties and ballast provided a natural cultural medium to sustain, forever, the typhoid bacillus dropped in the excrement from persons infected with typhoid fever.

Dr. Barringer's plausible hypothesis apparently received wide acceptance among the sanitarians of his day, despite the lack of convincing evidence. Although some investigators expressed doubt as to its validity, the existence of a sanitary problem was generally recognized.

One of the earliest real issues in which contamination from passenger trains was brought sharply into focus arose in Seattle, Wash.[5] In 1906 the Chicago, Milwaukee and Puget Sound Railway Company applied to the City Council of Seattle for a franchise to build and operate a railway line along the Cedar River, the source of water supply for Seattle. The City Council was preparing to deed the necessary right-of-way to the railroad company when a storm of protests arose from the local populace, and the mayor was restrained by court action from signing the deeds. The residents believed that the railroad passengers could unduly pollute their drinking water supply.

After preliminary charges were heard, a joint committee was formed to repre-

* Presented before the Engineering Section of the American Public Health Association at the Seventy-fifth Annual Meeting in Atlantic City, N. J., October 8, 1947.

sent all aggrieved parties. Following the report of the joint committee, an ordinance was passed permitting the railroad to be constructed as originally petitioned and regulations were placed in force to control all sources of pollution in the watershed including the railroad.

George C. Whipple [6] was one of the first to call attention to another important health aspect peculiar to railroad transportation. In his text on "Typhoid Fever" published in 1908, he said: "In some places trains . . . are compelled to have their doors locked. While this prevents contamination of the roadbed, the continual damage to the health and comfort of passengers by reason of deprivation of toilet privileges might easily be a . . . serious matter. . . ."

In spite of these early strictures, however, improvements in railway sanitary devices found their place primarily in regulations concerning them rather than in actual installations. According to Crowder,[7] the *Interstate Quarantine Regulations* passed in 1894 dealt briefly with disinfection of wastes from sick persons. This was followed by regulatory action by individual states starting with Texas in 1904. The state laws subsequently passed were without interstate coördination, so that one state required what a neighbor state specifically prohibited.

The period from 1912 to 1920 saw many attempts among health agencies to bring about coördinated regulations which were agreeable to all concerned.[7-9] Finally a *Standard Railway Sanitary Code* was evolved from the regulations drawn up by the Director General of the railroads during World War I. This code was approved by the Conference of State and Provincial Health Officers of North America and in 1921 the *Code* and the *Interstate Quarantine Regulations* were brought into agreement with each other. During the same year the *Code* was approved by the American Railway Association.[10]

The *Sanitation Manual for Land and Air Conveyances Operating in Interstate Traffic* was promulgated by the U. S. Public Health Service on October 2, 1942.[11] The *Sanitation Manual* was an enlargement of the *Interstate Quarantine Regulations* of 1921. Finally, the latest revisions of the *Interstate Quarantine Regulations* were published on May 16, 1947.[12]

The many sanitary codes that have been prepared obviously deal with phases of railroad sanitation other than the subject of human waste disposal. All the material reviewed, however, is distinguished by the assumption, unsupported by any epidemiological data, that the discharge of raw feces and urine to the railway roadbeds constitutes a health menace and may spread disease. Dr. W. C. Rucker, then Assistant Surgeon General of the U. S. Public Health Service, was one of the first, and apparently the only person until recently, who publicly questioned this universally accepted hazard. Speaking before a meeting of the Chicago Medical Society in 1914,[13] he said: "From an aesthetic point of view, the practice (track pollution by interstate carriers) is reprehensible, yet no one has brought forward indisputable evidence that disease is, or may be, generally spread in this way." "Track pollution is undoubtedly a dangerous practice under certain circumstances, and watersheds should always be protected from pollution; however, the knowledge which we have at hand does not indicate that all track pollution results in human disease. What we require first is exact knowledge of the amount of disease spread by track pollution. . . ." "Having that, it will be easy enough to put control measures in operation."

1. JOINT COMMITTEE ON RAILWAY SANITATION, ASSOCIATION OF AMERICAN RAILROADS

The developments which led to the

adoption of the *Standard Railway Sanitary Code* were followed with keen interest by the railroads. Individual lines through their medical departments cooperated whenever possible in the preparation of the regulations. Experience in the building of the railroads had demonstrated the need for sanitary control in railroad operation.[14–18] Indeed, railroads frequently led the way in applied preventive measures, as evidenced by one southwestern railway which inaugurated a comprehensive malaria control program in 1917.[19]

The first joint action on the part of the railroads was the appointment in 1921 of a special committee on sanitary matters to consider recommendations of the Public Health Service that ice be separated from the drinking water in the car water dispensers. From this beginning, the committee handled other problems on drinking water supplies, and in 1922 a Joint Committee on Drinking Water Supplies was formally organized. The scope of the activities of the Joint Committee soon enlarged and in 1928 it was redesignated as the Joint Committee on Railway Sanitation. The Joint Committee was made up of representatives of the Medical and Surgical Section and of the Mechanical Division and the Engineering Division of the Association of American Railroads. In addition, representatives were invited from the U. S. Public Health Service and the Department of Health and National Welfare of the Dominion of Canada. The Joint Committee published its first report on railway sanitation [20] in 1931, following it later with a supplemental report.[21]

II. REGULATIONS GOVERNING HUMAN WASTE DISPOSAL

Regulations governing the disposal of human wastes from railroad passengers have not changed much over the years. At least as early as 1888, local ordinances required the locking of toilet room doors in stations and coach yards and while passing through cities and watersheds of drinking water supplies. More recently these restrictions were liberalized to permit the door to remain open upon the condition that retention tanks or soil cans were provided or that the hoppers were directly connected to the sewer.

In the *Sanitation Manual* for 1942 the Public Health Service expressed the belief that the ultimate solution of the problem of sewage disposal on railroad cars would be the permanent installation of retention tanks on the cars to receive the flushings from the toilet hoppers. These tanks would be emptied as necessary when the cars were being serviced in the coach yards, by connection to sewer system inlets. Recognizing the many difficulties involved in such an arrangement, the Service recommended to the Association of American Railroads that the carriers work toward such a goal by experimental and engineering study.

The Joint Committee on Railway Sanitation was of the opinion that the use of retention tanks was open to serious question, especially in view of the mechanical difficulties and the space limitations on the cars. Therefore, the committee proposed a program of research and investigation into the entire problem to find the most suitable means for handling and disposing of sewage wastes. The program was approved by the Association, but action was withheld during the war until January, 1946, when the Consultant Director was retained under whom the work was organized and subsequently directed, personnel was procured, and office and laboratory facilities provided.

III. RAIL CARRIERS AND THE SPREAD OF DISEASE

The first question confronting the Project investigators was the same question posed by Dr. Rucker in 1914;

namely, to what extent have the rail carriers been responsible for the spread of disease? Since the literature discloses virtually no exact data on the subject, Dr. Kenneth F. Maxcy, Epidemiologist, was retained to review all the pertinent evidence and to report upon his findings and conclusions. Aside from the public health implications, some quantitative indication of risk was essential as a basis for further investigation of corrective procedures and devices.

In his study,[3] Maxcy reasoned that "if the disposal of sewage along railways has been a public health menace, this fact should be indicated by the unusual incidence of typhoid fever from about 1900 up to about 1920 among persons particularly exposed to this source of infection, (1) by reason of location and residence in proximity to tracks and terminals, (2) by reason of being employed in work on railways, or (3) by reason of being consumers of a water supply which might be polluted by railways at some point in collection or distribution."

With this premise and despite an exhaustive survey, Maxcy was unable to discover convincing evidence that wastes from railroad passengers caused an outbreak of typhoid fever among persons in the three classifications mentioned above for the period 1900–1921. A study of the literature from 1920 to 1945 on all recorded enteric disease outbreaks failed, furthermore, to incriminate sewage wastes from passenger trains. Maxcy's report concludes that "It can be stated with reasonable assurance that information at present available fails to establish the existence of a public health menace resulting from the method of disposal of fecal wastes employed by railways. This by no means proves the negative—that such a menace does not exist. It is reasonable to assume, however, that this practice has in the past been a relatively unimportant route of dissemination of the pathogenic organisms which cause the commonly recognized enteric infections."

It is an interesting commentary on this whole problem that neither the public health agencies nor the railroads had ever authoritatively canvassed this basic hypothesis upon which virtually all the codes and regulations rested. A similar dearth of data on the habits of railroad passengers, data essential to the development of any corrective, parallels the same half century of debate.

IV. STUDY OF EXISTING PATENTS

Inquiries directed to railroads in the United States and Canada, to foreign railways, and to American railroad car builders, disclosed that only one company[22] had considered improved methods for human waste disposal to the extent that models were prepared and placed in test. The devices, considered impracticable, did not progress beyond the experimental stage.

When the search turned to the Patent Office, however, this particular field was found to be thoroughly exploited.[23] Inventors have been busy designing new hoppers and methods of treatment and retention almost since passenger trains began running. The patents now in effect may be generally classified as providing for (a) a means for holding the wastes to prevent discharge in stations, (b) disinfection by electrical or steam heaters or by chemicals with and without prior comminution of solids, and (c) incineration of solid materials.

V. INVESTIGATION OF PRESENT DISPOSAL PRACTICES

It was evident early in the Project that development work could not proceed intelligently without a thorough knowledge of existing conditions on toilet use. Careful search revealed that these conditions had never been ascertained previously. The habits of the railroad passenger in the use of toilets and the nature and quantity of the toilet

wastes therefore required detailed field study.

The first investigation,[24] in 1946, was confined to coach passengers. A similar investigation is now being completed on sleeping cars and overnight coaches on long-distance schedules and on passenger coaches in branch-line use.

The first study was conducted on the cars and trains of the Pennsylvania Railroad. A standard passenger coach was used in the New York-to-Washington schedule during daylight hours, and in the Pittsburgh-to-Washington schedule on an overnight run. A passenger coach with reclining seats was used on the overnight run from Chicago to Washington.

Data were obtained on a total of 30 separate runs. The toilet habits of more than 2,000 persons were studied while they were traveling a total of 6,251 passenger-hours over a total distance of 320,000 passenger miles.

The men's and women's toilets in each coach were equipped with recording apparatus (Figure 1) which included: (1) a counter to register each opening of the toilet room door; (2) a water meter inserted in the water line to the toilet hopper; and (3) a flush recorder actuated by a mercury switch attached to the flush lever. The flush recorder operated with a chart which showed the individual flush and the length of time the flush lever was depressed. Male and female passengers were counted and recorded on each run after every major station stop. Entries to and exits from the toilets were observed and recorded.

Each test car was equipped with a

FIGURE 1—Arrangement of Equipment on Test Cars

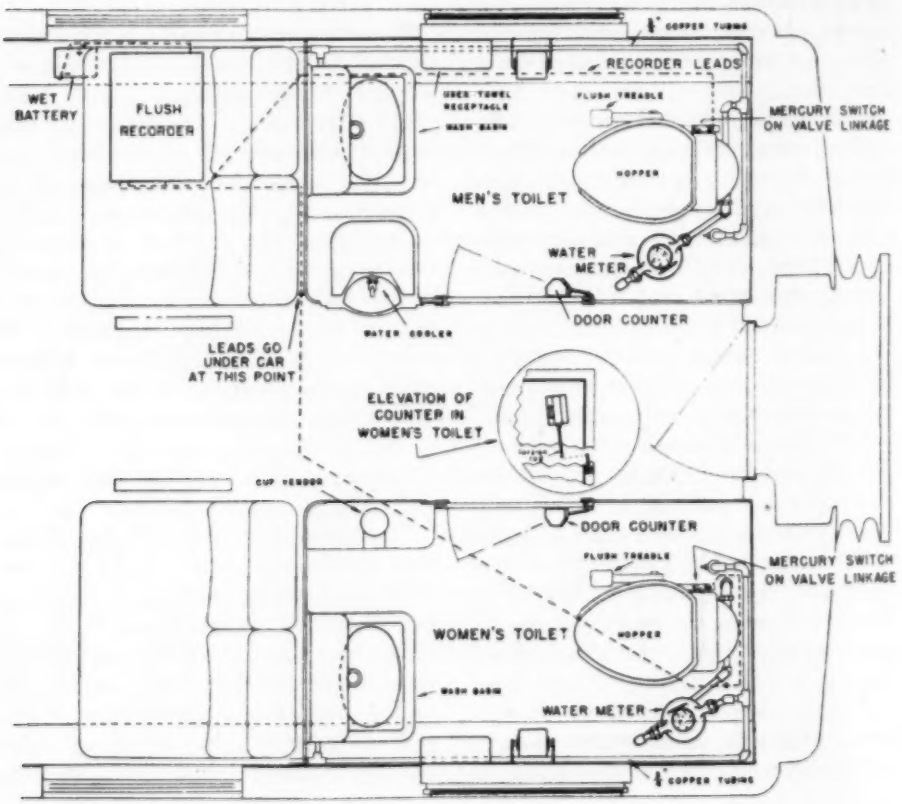
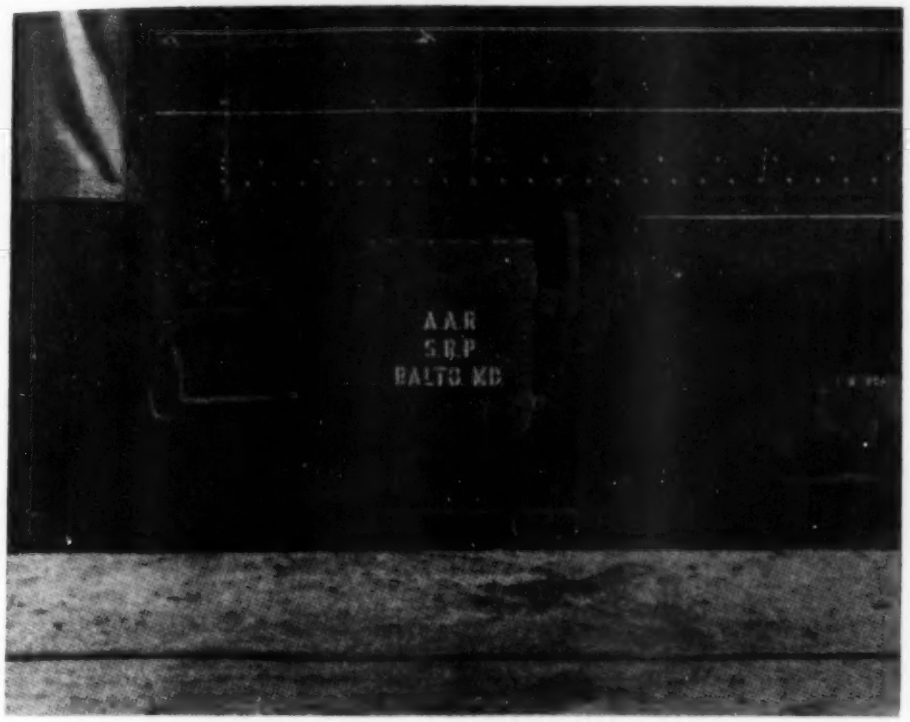


FIGURE 2—Retention Tank Installed in Test Car No. 4241



retention tank to receive all of the material flushed from the toilet hoppers (Figure 2). The retention tank was removed at the end of each run, its contents passed through a grinding mechanism, and an aliquot portion of the macerated material was removed for analysis for solids content.

A. *Toilet Room Occupancy*

The data obtained on toilet room occupancy (Table 1) on the Pennsylvania Railroad coaches reveal that on the average, the women's room was entered once for every 6.8 passenger-hours. The men's room was entered more frequently—once for every 4.9 passenger-hours. The duration of occupancy for both sexes varied from 1 to 26 minutes, while

TABLE 1

Summary of Occupancy Results

	Male			*Female*		
Schedule	*Average Entries per Hour*	*Passenger-Hours per Entry*	*Average Occupancy, Minutes*	*Average Entries per Hour*	*Passenger-Hours per Entry*	*Average Occupancy, Minutes*
New York–Washington	6.5	5.2	2.8	3.9	6.2	3.5
Pittsburgh–Washington	3.4	7.5	3.4	1.9	10.9	3.3
Chicago–Washington	4.4	4.0	3.2	2.0	6.1	5.5
Average	4.8	4.9	2.9*	2.6	6.8	3.5*

Combined Male and Female Average, all schedules

Average Entries per Hour	3.7
Passenger-Hours per Entry	5.6
Average Occupancy, Minutes †	3.1

* New York–Washington and Pittsburgh–Washington Schedules only.
† Based on total for all schedules.

TABLE 2

Average Number of Passenger-Hours per Flush

Schedule	Passenger-Hours		Flushes Recorded		Average Number Passenger-Hours per Flush	
	Male	Female	Male	Female	Male	Female
New York–Washington	1,196.0	757.3	119	68	10.1	11.1
Pittsburgh–Washington	875.0	512.9	52	24	16.8	21.4
Chicago–Washington	1,705.0	1,215.0	259	179	6.6	6.8
Totals	3,776.0	2,485.2	430	271	...	...
Averages	.....	.....	...	...	8.8	9.2
Combined Totals	6,261.0		701		...	
Combined Averages	.....		...		8.9	

the average was approximately 3 minutes.

The toilet rooms on trains in transcontinental service were occupied more frequently. There was an entry for every 3.5 passenger-hours for both sexes.

For all of the toilet rooms studied the average entry occurred every 11 minutes. The individual passenger entered once every 4 hours.

B. *Flushing of the Hopper*

Hoppers in the shorter scheduled trains were flushed 701 times in the 30 runs that were studied. This is an average for male and female combined of 8.9 passenger-hours per flush (Table 2). So far, 6,354 flushes have been recorded on the transcontinental trains—an average of 3.5 passenger-hours per flush.

The duration of the flush—i.e., the length of time the flush lever is depressed—was found to average 3 seconds for all schedules for both sexes.

The interval between flushes for the short schedules was about 27 minutes. Nearly 50 per cent of all intervals between flushes were less than 15 minutes (Figure 3). Ten per cent were greater than 60 minutes.

Only about one-half of the short distance passengers flushed the hopper after entering the toilet room.

FIGURE 3

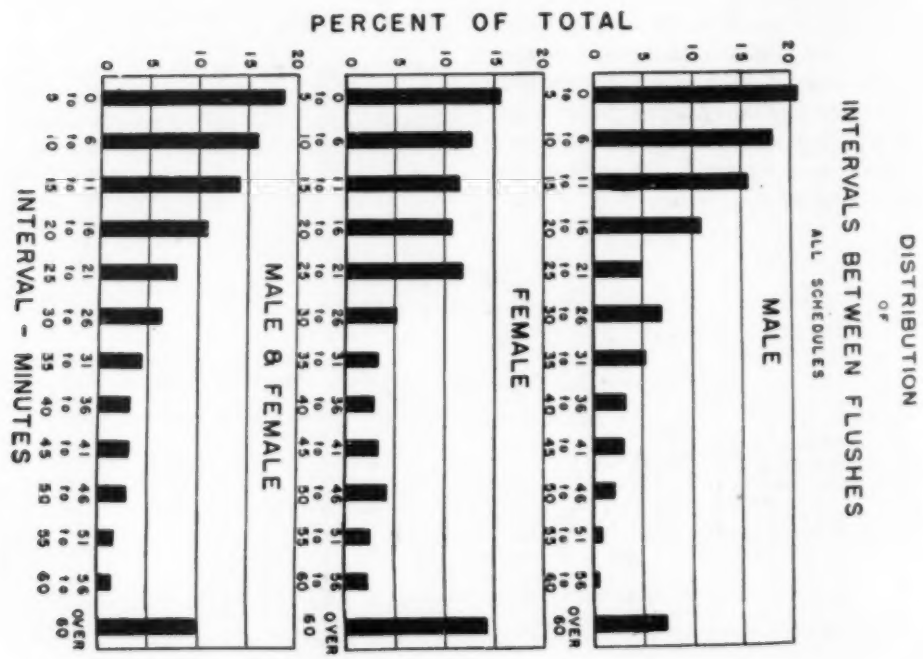


TABLE 3

Contents of Solids in Various Discharges—Averages for All Runs

Sex	Insoluble Solids						Soluble solids						Total Volatile Solids		Total Non-Volatile Solids		Total Solids	
	Volatile		Non-Volatile		Total		Volatile		Non-Volatile		Total							
	p.p.m.	%	p.p.m.	%	p.p.m.	%	p.p.m.	%	p.p.m.	%	p.p.m.	%	p.p.m.	%	p.p.m.	%	p.p.m.	%
Male—Average	3,107	31	723	7	3,838	39	3,136	32	2,969	30	6,105	61	6,251	63	3,692	37	9,943	100
Female—Average	3,234	35	382	4	3,614	39	2,805	31	2,712	30	5,568	61	6,030	66	3,144	34	9,185	100
Combined Male and Female																		
Over-all Average	3,158	33	586	6	3,749	39	3,003	31	2,866	30	5,890	61	6,166	64	3,473	36	9,640	100
Over-all Maximum	6,840	..	1,600	..	7,400	..	10,460	..	6,970	..	14,480	..	17,300	..	7,390	..	21,880	..
Over-all Minimum	1,430	..	0	..	1,410	..	67	..	790	..	857	..	1,551	..	839	..	2,390	..

C. *Water Consumption*

The quantity of water drawn through the toilet hoppers was less than had been anticipated. An average of only 8 gallons of flushing water was consumed by the test coach in the New York-to-Washington and the Pittsburgh-to-Washington schedules. About 25 gal. were consumed by both sexes from Chicago to Washington. An average of 120 gal. was metered for the overnight coach operating between Chicago and Los Angeles, while the Chicago-to-Portland run averaged about 220 gal.

Although the shorter schedules gave an average of 1.5 quarts of water per flush, as compared with about 1.0 qt. per flush for the cross-country trips, the per-passenger-hour consumption favored the long distance traveler by nearly three to one (0.4 qt. per passenger-hour as compared to 0.15 qt. per passenger-hour). These figures vary widely, however, depending upon the type of flushing valve and the flushing action employed.

D. *Nature of Wastes*

To determine the nature of the wastes, 1 gal. samples of the captured material, after maceration, were delivered to the National Institute of Health at Bethesda, Md., where solids determinations were made on multiple samples from each of three separate schedules. Two representative samples were delivered to the Blue Plains Sewage Treatment Plant at Washington, D. C., for determination of the Biochemical Oxygen Demand.

Total solids were found to average about 10,000 p.p.m., of which about 60 per cent were soluble solids. There was little variation between sexes. Detailed data are shown in Table 3.

The average of the results of the tests for B.O.D. was found to be 2,100 p.p.m., or a strength of sewage roughly 9 times that of ordinary domestic sewage.

In addition to the normal constituents of the sewage, the nature and number of foreign objects were determined by examining the contents of the retention tanks at the conclusion of each run. The foreign objects consisted of one man's handkerchief, a miniature whiskey bottle, heads of two brass screws, and miscellaneous cigarette and cigar butts, cigarette packages, cigar wrappers, chewing gum, and orange peels.

Interrogation of the servicing personnel in the coach yards revealed that frequent hopper stoppages by foreign objects can be expected. In order to obtain more information on the subject, therefore, a questionnaire was sent to representative railroads throughout the coun-

try. The replies from twenty-nine railroads revealed no fewer than 58 different kinds of objects causing hopper shortages ranging from radiator caps to human fetuses. These objects were classified into the following categories:

Cloth Objects	Bottles and Jars
Wearing Apparel	Tin Cans and Containers
Leather Articles	Food
Paper and Cardboard	Miscellaneous

E. *Quantities of Wastes Discharged*

Having determined the content of solids in the toilet wastes and knowing the quantities of water used, the total amount of sewage solids deposited from the test cars to the right-of-way has been calculated.

For the combined total of 701 flushes there was an average weight of sewage solids per flush of 0.026 lb. dry weight (Table 4).

The total sewage solids deposited from the test cars to the roadbed per average hour were 0.121 lb. dry weight. The overall average of total wastes contributed per 100 passenger-hours was 0.258 lb. dry weight.

On the average the test coaches deposited approximately 0.00235 lb. dry weight per mile of track for a single run. Assuming the coach to make one run daily throughout the year, the average yearly deposition per mile of track from a single coach amounts to 0.858 lb. dry weight. The New York-to-Washington schedule gave results about 3 times greater than this average, due, no doubt, to the crowding of coaches on these trains.

Assuming that the values for the solids content are representative of all toilet wastes from railroad cars, it is interesting to compute what will be the total weight of sewage solids deposited throughout the country from all railroad passengers. Passenger coaches traveling approximately 1 billion miles per year[26] at an average speed of 35 miles per hour[27] will thus release annually about 3,460,000 lb. dry weight of sewage solids. Spread over 160,000 miles of track in passenger traffic,[27] this quantity averages about 0.20 oz. dry weight per yard for coach passengers. Assuming that 65 per cent of all passenger-miles are traveled in coaches,[26] the final estimate becomes 0.302 oz. dry weight per yard of track per year.

F. *Field Inspection*

The quantity of sewage wastes deposited on the roadbed on a country-wide basis seems to be almost insignificant. It is realized, of course, that a great deal of the passenger traffic is confined to specific sections of track. For instance, the Pennsylvania Railroad reports that during 1946 passenger coaches traveled a total of 78,628,188 miles between

TABLE 4

Toilet Wastes per Flush in Pounds *

	Insoluble Solids		*Soluble Solids*		*Total Solids*	
Schedule	*Dry Weight*	*Wet Basis*	*Dry Weight*	*Wet Basis*	*Dry Weight*	*Wet Basis*
New York–Washington.						
Male	0.015	0.106	0.027	0.197	0.042	0.303
Female	0.013	0.093	0.026	0.188	0.039	0.281
Weighted Average	0.014	0.101	0.027	0.194	0.041	0.295
Pittsburgh–Washington						
Male	0.013	0.090	0.023	0.166	0.036	0.256
Female	0.008	0.058	0.010	0.074	0.018	0.132
Weighted Average	0.011	0.077	0.018	0.128	0.029	0.205
Chicago–Washington						
Male	0.009	0.064	0.008	0.059	0.017	0.123
Female	0.013	0.096	0.016	0.112	0.029	0.208
Weighted Average	0.011	0.077	0.011	0.082	0.022	0.159
Average of All Schedules						
Male	0.011	0.076	0.015	0.104	0.026	0.180
Female	0.012	0.087	0.016	0.114	0.028	0.201
Weighted Average	0.011	0.079	0.015	0.107	0.026	0.186

* The figure submitted by the National Institute of Health showed solids on the dry weight basis. When sewage solids are deposited to the roadbed in the normal course of operations, however, they contain a high percentage of moisture. Studies in the laboratory indicate that the solids of a representative toilet discharge including feces, urine, and toilet paper average about 86 per cent moisture. This figure was found to agree closely with the figures given by Keefer[25] of 77.2 per cent moisture for feces and 96.3 per-cent urine, assuming equal weights of each distributed in one toilet use.

New York and Washington. This represents the heaviest through passenger traffic in the United States. At an average speed of 55 miles per hour,* sewage solids from this traffic will amount to about 0.7 lb. dry weight per yard per year. This figure may be increased by about 54 per cent [26] to account for other-passenger carrying cars, such as Pullmans, parlor cars, etc., so that the final quantity becomes 1.067 lb. dry weight per yard per year.

The calculated quantities of sewage solids discharged between Washington and New York indicate that at least a certain amount of recognizable feces should be found by actual inspection of the roadbed. Examinations of sections of Pennsylvania Railroad right-of-way on the north and south approaches to Baltimore revealed that on the average there were evidences of 13 discharges per mile containing recognizable fecal matter.

The extent of dispersion of the normal toilet flush from a moving train has been studied to some extent. Examination of the roadbed reveals that when a hopper is discharged at 60 miles per hour, the material will be spread out over a distance of 100 to 150 feet, and over a width of 10 to 12 feet at mid-distance. The fecal matter in the flush is usually confined to a much smaller area, being not more than 30 feet in length and 4 to 5 feet wide. Due to the train speed, the solid matter is usually found plastered against the exposed side of the ties which face the oncoming train.

Not all of the flushed material reaches the roadbed. As many car repairmen will testify, a goodly portion is thrown against the undercarriage of the car and on the steps if they are non-retractable.

G. *Bacteriological Examination of Ballast*

A limited bacteriological examination has been conducted on the ballast taken from the Pennsylvania Railroad trackways near Baltimore carrying heavy passenger traffic. Samples were taken from the surface of the ballast and from depths of 6 to 12 inches and examined for the presence of coliform organisms. Preliminary results show that 50 per cent of the surface ballast supported no coliform growth, while the remainder gave counts of approximately 4 coliform organisms per sq. cm. of surface area of stone. The subsurface ballast gave positive results for coliforms in all samples, 80 per cent of the samples showing counts of fewer than 50 per sq. cm. of surface area. This ballast has been in service about 10 years according to the railroad authorities. Similar examination of five samples of new unused ballast gave all negative results.

* Based on P.R.R. timetables

VI. PRESENT STUDIES

Simultaneously with the study of the existing methods of toilet waste disposal and the use of toilet facilities, the Project has experimented on a great many treatment methods and devices. These efforts have been directed toward programs for comminution and disinfection.

Subdivision of particles was considered desirable not only to simplify the disinfection process, especially if disinfection is to be accomplished by heat, but also to convert feces, paper, and cloth articles into a sufficiently finely divided state to reduce visibility on controlled discharge at high train speeds. Such a device must be rugged because of metal and glass objects; it must be small and a low power-consumer. The search is continuing for the ideal grinder, but a commercial unit exhaustively tested in the laboratory has been installed on a hopper on a test car of the Pennsylvania Railroad operating between New York and Washington. So far it has proved satisfactory operating under summer conditions.

Extensive research has revealed that disinfection of macerated toilet wastes by heat is well within the realm of practicability. Much experimentation remains to be done on the preferred methods of applying the heat, but the source of heat is apparently sufficient when supplied either by electrical means or by steam, or by a combination of the two. These means are being employed in a test apparatus mounted on the Pennsylvania car carrying the grinder. Although sufficient data are not available at this time to warrant conclusions, it may be stated that a temperature not exceeding 160° F. and a holding time of not more than a few seconds will produce the desired negative coliform results.

Because of infrequent use the railroads might not feel justified in the purchase of treatment units for hoppers in coaches on branch lines. For such conditions consideration is being given to the development of a simple receptacle to hold all of the flushings until the terminal is reached, where receptacle and contents might be destroyed. For some conditions holding in stations may be all that is necessary. Certainly one cannot escape the conviction when traveling through the great unpopulated expanses in the West that discharge of human wastes, treated or raw, would have little effect on the local morbidity rates or on potential hazards.

The results of further laboratory and field studies will be released at intervals by the Project. In the meantime, direct consultation with public health agencies, professional groups, and others proceeds in order to correct, as rapidly as possible, aesthetic and public health hazards in the disposal of human wastes in railroad transportation.

ACKNOWLEDGMENT — The data presented herein have been obtained through the cooperation and assistance of the Pennsylvania Railroad, the Baltimore and Ohio Railroad, the Joint Committee on Railway Sanitation, and officers of the Association of American Railroads.

The detailed accumulation, calculation, and tabulation of the data in the studies on patents, toilet use, and nature of wastes, ballast and right-of-way deposits are primarily the accomplishments of the following members of the Sanitation Research Project: William A. Hazlett, Mechanical Engineer; Frederick G. Whelan, Electrical Engineer; Patrick N. Owens, Assistant Sanitary Engineer; and Ralph F. Vaccaro, Bacteriologist. The burden of typing, proofreading, and editing has been carried by F. Marie Ridley, Secretary, and Clara-Louise Kuehn, Laboratory Assistant.

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Health Education Workshop

Notice of the following health education workshops has come to the *Journal*:

Western Reserve University, June 21–July 31, limited to 50 men and women from the educational field (teachers and nurses). Course will grow out of the problems presented by the individuals at the first session on June 21. Director, Charles F. Good, M.D., Director of Cleveland's School Health Service and pediatrician in Western Reserve Medical School and University Hospitals. Tuition, $84. Credit, 6 semester hours. Apply for admission 1 month before registration to Graduate School, Western Reserve University, Cleveland, Ohio.

Yale University, Graduate School, Department of Education. June 26–August 6, plus 2 weeks for preparation of term papers. Seminar in secondary school education designed particularly for teachers responsible for teaching or organizing high school health education programs, using workshop techniques. Director, Charles C. Wilson, M.D., Professor of Education and Public Health, Yale University. Tuition $120. Scholarships available. Credit, one-fourth of a year's work or 8 points. Apply Clyde M. Hill, Chairman, Department of Education, Yale University, New Haven, Conn.

George Williams College, Lake Geneva Campus. College Camp, Wis. July 6–31. Is a workshop in education for health and fitness designed for teachers, community workers, nurses, and others interested in health? Tuition and living expenses $165 and up. Scholarships available. Credit, six quarter hours. Apply Arthur H. Steinhaus, Director of the Workshop, George Williams College, Chicago 15.

University of Cincinnati, June 21–26. Faculty includes Dr. Helen L. Poops, Health Coördinator. One hour of credit as an auditor with an additional hour upon successful completion of assigned field work. Apply Dr. Spencer Shank, Dean, Summer School, University of Cincinnati, Cincinnati 21, Ohio.

Essentials for the Control of Ragweed*

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IT has been estimated that there are over 3,000,000 persons in the United States who suffer from hay fever caused by ragweed. The U. S. Public Health Service, in a leaflet on hay fever, states that ragweed grows in sufficient quantity in much of the territory east of the Rocky Mountains to produce symptoms of ragweed hay fever in an estimated 2 to 3 per cent of the inhabitants of the area. It is generally recognized by allergists that its prevalence has been steadily increasing from year to year. In a report on chronic diseases taken from the data collected in the National Health Survey conducted by the U. S. Public Health Service during 1935 and 1936, "hay fever and asthma" stood fourth in prevalence in a list of chronic diseases and was exceeded only by rheumatism, heart disease, and arteriosclerosis and high blood pressure. In this list, hay fever and asthma exceeded such chronic diseases as hernia, chronic bronchitis, cancer and other tumors, tuberculosis, diabetes mellitus, and others.

Thommen[1] estimates that pollen asthma occurs in about 35 per cent of all hay fever subjects in the New York area, and Huber[1] reports that pollen asthma occurs in about 54 per cent of the Chicago hay fever sufferers.

The discovery of the herbicide, 2, 4-dichlorophenoxyacetic acid opened a new field in public health by making it possible to eliminate ragweed from vast areas at a reasonable cost, only a fraction of that required for mosquito control.

Ragweed hay fever, then, can be said to be a fairly common disease and the weapon to control it is now available. It should, therefore, receive the attention of governmental authorities as a public health problem. R. P. Wodehouse, who is probably the best informed botanist on the subject of ragweed and its control, expresses his feelings on the subject in a letter written in 1939 to one of the authors as follows: "Hay fever can be cured by treating the environment instead of the patient. In fact it is the only way that it ever will be cured."

Before outlining the New York City ragweed control program, some of the essential knowledge necessary to bring about control of ragweed will be discussed.

For the past 25 years a considerable amount of information has been accumulated on the concentration of ragweed pollen in the air. One of the outstanding contributors is O. C. Durham[2] of Chicago. Much of this work has been done in response to the demand for information on the part of allergists and hay fever sufferers. The United States has been fairly well covered in a general

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* Presented before a Joint Session of the Engineering and Industrial Hygiene Sections of the American Public Health Association at the Seventy-fifth Annual Meeting in Atlantic City, N. J., October 7, 1947.

† Now Director, Bureau of Health Education.

way by data collected from a number of stations, made possible by the coöperation of the U. S. Weather Bureau. Maps are available which divide the United States into regions in accordance with the variations in the amount of ragweed pollen in the air, as shown by these spot checks.

In order to use the pollen content of the air as a device for evaluating ragweed control programs, it is necessary to plan the location and number of pollen sampling stations so that an adequate picture of the variation in pollen content throughout the areas can be obtained and accurate related meteorological and ecological data accumulated. It is possible that in the early stages of the development of ragweed control programs, the weather may have a greater influence on the pollen content in an area than the elimination of some of the ragweed plants. As ragweed control programs become effective over large areas, there will be a need for sufficient data to explain the presence of, or the year-after-year reduction in the ragweed pollen content in areas where the ragweed plants have been reduced in number or eliminated. It will not be sufficient to have the results of one or two stations used as an index of the completeness of a ragweed elimination program over an extensive area any more than one or two adult mosquito traps will serve as an index of the effectiveness of a mosquito campaign. It is recognized that there is a considerable difference between the distribution of adult mosquitoes from a source of breeding and the distribution of pollen from an area of ragweed plants. An air pollution survey in 1936 conducted by the New York City Health Department indicated a considerable variation in the pollen content of the air in the 5 boroughs of the city and this variation was related to the amount of vacant area in those boroughs.

In response to a demand for standardization of procedures in pollen collecting and counting, the American Academy of Allergy [3] several years ago appointed a National Pollen Survey Committee to study and recommend standards for pollen collecting and counting. A preliminary report of the work of this committee has already been published which includes the recommended standards.

A group of allergists [4] in the Division of Allergy of the Jewish Hospital of Brooklyn, in collaboration with the Pollen Survey Committee of the American Academy of Allergy, conducted studies during 1946 and 1947 in an attempt to shed some light on the influence of ragweed control programs on the pollen content of the air. They outline the reasons for their studies as:

1. To determine the relative ragweed pollen concentrations in various boroughs
2. To determine whether the pollen counts of Brooklyn and Manhattan, the only boroughs studied in the past, have been representative of the entire city
3. To determine to what extent ragweed pollination in surrounding communities influences New York's pollen problem
4. To collect data which might help to determine the effectiveness of the ragweed extermination campaign which is being carried on by the Department of Health in this city
5. To obtain further data on the relationship of meteorologic conditions to pollen counts

The plants, *Ambrosia artemisiifolia* and *Ambrosia trifida* (short and giant ragweed) are the principal cause of autumn hay fever. Ragweed pollen is buoyant, abundant, and has high allergenic toxicity. The seeds, which are dropped close to the plant are disseminated by water, animals, and man. They are heavy and do not ordinarily move far from the plants which produced them. Ecologists classify plants into 3 general categories: pioneer, intermediates, and climax vegetation. This natural phenomenon is known as plant succession. Pioneer plants [5] are able to grow on barren soil serving as nature's

rescue squad to prevent the total waste of top soil. The most important pioneer plant is the ragweed. Where these pioneer plants are able to establish themselves they flourish over a period of years until they are able to restore the soil so that it will support an intermediate group of plants such as the late weed and grass plants. This process may take 10 or more years. As the intermediate plants establish themselves, the pioneer plants are forced out by competition. The ragweed plant is not only a pioneer; it is also a non-competitive plant. If left alone, this intermediate stage would then give way to climax vegetation. Only selected areas are ever allowed to return to climax vegetation. According to Wodehouse, the Indians had no hay fever because they lived in the primeval forest or on the native prairies. In those early days the land was clothed with climax vegetation. As the white man built cities and towns cutting down the forests and developing farms and highways, climax vegetation was removed and much of the soil was left bare. Hay fever is nature's reply to man's wasteful exploitation of natural resources.

Little is known of the ecology of the ragweed plants. A number of problems are already arising in connection with developing the most effective program of control. A study of the reaction of plants to the use of 2, 4-D on such a wide scale as practised in New York City during the past 2 years promises to develop some of the unknown facts.[6] Ragweed plant ecology is as important to the future ragweed control programs as entomology has been to programs to control insects.

A quotation from a letter received in 1939 from a public health official indicates how easy it is to make mistakes in dealing with a question about which little is known. "I am puzzled as to whether your plan would be effective. For example, ragweed has not been found in New York City and I am certain that within a radius of at least 10 miles of Fifth Avenue and 42nd Street there is no ragweed. The question therefore arises whether the pollen which is transmitted by wind from rural areas might not be more important in causing hay fever than that which grows within the bounds of a city."

Actually there were approximately 500 acres of ragweed growing in Manhattan. Within a radius of 10 miles there was probably as heavy a growth of ragweed as could be found in any similar 10 mile radius in this section of the country. In many sections of the country, as in this area, ragweed is an urban problem even more than a rural problem. Many of the projects built by man which remove plant cover from an area take place in cities, where farms are being abandoned and subdivided for development, where streets are being built without finishing the curbs and sidewalks, where rain run-off is being concentrated more rapidly in natural drainage ditches. Rural areas in general are more stable except perhaps along the highways. They may not be the main problem as visualized by health workers who have not tackled the problem of control in earnest.

Several years ago the selective herbicidal properties of the potent plant-growth-regulating substance 2, 4-dichlorophenoxyacetic acid (2, 4-D) and its derivatives were discovered. In 1945 sufficient quantities of this chemical became available.[7] Thirty to 40 different manufacturers offered 2,4-D in the form of salts, esters, and related derivatives which, in a concentration of 0.1 per cent by weight, would kill broad leaf plants but not grasses and other resistant plants. The herbicide is absorbed by the plant. transferred to the lower stem and roots, causing the plant to starve. The first symptoms are bending and twisting of stems and leaves followed usually by swelling, cracking, and split-

ting of the stems, yellowing, browning, and drying up. The roots become spongy, enlarged, and water soaked.

The New York City Department of Health[6] studied the possibility and practicability of using this herbicide to control ragweed on a city-wide basis. Two demonstrations showed that when it was applied as a 0.1 per cent solution, wetting about 90 per cent of the plant foliage, it would kill the weeds without injuring the grasses. Approximately 200 gallons were found to be necessary for one acre of ragweed and 1 crew, consisting of a spraying unit and 3 men, could spray approximately 2½ acres a day. Approximately one pound of 2, 4-D powder makes 100 gallons of the 0.1 per cent herbicide solution, bringing the cost of chemical to about $2 an acre; 2, 4-D has certain advantages over chemicals that have been used in the past. It is non-corrosive, non-inflammable and will not explode. In addition, it is not poisonous to human beings.

Ragweed plants shed their pollen early in August and produce seeds a short time later. In order to obtain maximum benefits, the plant should be destroyed by the early part of August so as to prevent the shedding of pollen or the dropping of seeds. Ragweed is an annual plant, therefore, if all the plants were destroyed in any one year, there would be no ragweed seeds dropped to produce plants in future years. It is possible to destroy all of the ragweed seeds produced in an area that is properly sprayed in any one year. However, it is impossible to destroy all the ragweed seeds in existence as a small proportion of each year's crop of seeds remains viable in the soil and a few of these will grow when the soil is disturbed, exposing the seed. The number of plants growing from old seeds is small compared to the total annual crop of seeds once the ragweed plant has become generally established in an area. The number of plants coming from the old seeds depends on the amount of soil which is disturbed by the abandoning of farm land and the barren soil left along the sides of new roads and areas where the cover crop is laid waste and the surface remains bare.

Experience indicates that the selective action of the herbicide hastens plant succession by killing the ragweed plant. It seems to encourage the growth of the intermediate plants, namely, late weeds and grasses. Indications are that the spraying of the ragweed plant aids in building soil. Extensive areas where both ragweed and other plants were growing, which were sprayed in the 1946 campaign, produced a solid growth of grasses and other plants during the season of 1947. The spraying not only killed the ragweed plants of that season, but hastened the phenomenon of plant succession, establishing the intermediate stage of plants which not only controls erosion but discourages the growth of the ragweed, a non-competitive plant.

Attempts to enforce city laws requiring property owners to destroy ragweed on their property have been not only costly in time consumed but also ineffective. Many property owners could not be located and others could not be induced to eliminate the weeds in time to prevent the spilling of pollen and the production of seeds. Centrally directed campaigns to eliminate seeds by cutting and grubbing on a city-wide basis, although more successful, have generally failed because of the cost and the fact that much of the work accomplished did not always prevent pollination. Plants grew back and pollinated and produced seeds in a few weeks' time. Wherever the soil was disturbed, dormant seeds were given an opportunity to germinate.

Much can be done to support a city-wide spraying program by securing the coöperation of property owners in eliminating ragweed from their property, particularly when they are living on it or

otherwise using it. The bulk of the ragweed growing on vacant lots along highways and in alleyways, however, must be controlled on a city-wide basis.

Highway and public works departments with a practical knowledge of the factors which promote the growth of ragweed plants, can do much to prevent their growth in the development and maintenance of streets and highways. There is a striking difference between the amount of ragweed growing along the depressed speedways in New York City and that growing along service roads feeding these highways, particularly in the suburban areas of the city. Plant cover is required to control erosion along the banks of the depressed highways and this cover, which is usually grass, Japanese honeysuckle or barberry bushes, provides the competition which prevents the growth of ragweed.

Due to a marked increase in city-wide budget costs during this post-war period, it was not possible to purchase new equipment. Therefore, all available community resources were utilized in the ragweed control program. The Commissioner of Health secured the whole-hearted support of the Mayor who personally requested the coöperation of a number of city departments which were most helpful in the development of a practical control program.

The Health Department was the coordinating agency having responsibility for planning the budget and providing technical and supervisory guidance. It also carried on education and public relations on a city-wide basis. Several ragweed sufferers' groups assisted in this part of the program.

The Borough Presidents' Offices, that have jurisdiction over the streets in New York City assumed responsibility for the spraying. They engaged the labor, routed the trucks and supervised the men doing the work. They also released the information regarding the progress of the program in each borough.

The Department of Sanitation loaned the street flushers which were converted to provide power units for the spraying operations. The Department of Health and the Borough Presidents' Offices cooperated in properly equipping the trucks with hose connections, spraying nozzles and the like. The Park Department sprayed ragweed growing on the property under its jurisdiction. The Police Department, through its precinct safety inspectors, mapped the city showing the location and extent of all of the ragweed growing within its limits.

It is recognized that the control of ragweed is for the purpose of reducing pollen and, thereby, hay fever symptoms and should not be thought of in terms of a few square miles. The area of the City of New York covers over 320 square miles, but maximum benefits will require supporting programs in the adjacent communities. Considerable work has been done by the department to promote an interest in ragweed control programs throughout the metropolitan area of New York. This area includes sections of the States of New York, Connecticut, and New Jersey, and the area within a 50 mile radius of central Manhattan.

New York University, in coöperation with the Department of Health, conducted a course in the "Control of Plants Detrimental to Health." Two hour sessions were held on 6 Friday evenings during the spring of 1947. Over 100 people from the metropolitan area and even beyond took the course. A number of communities in this area initiated ragweed control programs, and it is anticipated that the number will increase from year to year as the success of these programs is demonstrated.

The Brooklyn Botanic Garden and the City Health Department sponsored a joint conference on the "Control of Plants Harmful and Annoying to Man."

This was an all-day conference and was attended by over 200 people including professional botanists, municipal and other official representatives of garden clubs. The Commissioner of Health of New York City called meetings of health officers and municipal officials from the metropolitan area to discuss the use of 2, 4-D for the control of ragweed. The Department of Health believes that within the next few years it will be possible to eliminate practically all the ragweed plants within the city limits, and every effort will be made to extend the ragweed control program throughout the metropolitan area.

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Maternal and Child Health Training Program

The Johns Hopkins University School of Hygiene and Public Health has established a specialized program in Maternal and Child Health. Its "purpose is to provide advanced training for a limited number of special students in the broad field of Maternal and Child Health with emphasis on the integration of administrative, clinical, and preventive skills and with attention to current developments and trends in medical care. It is particularly adapted to the needs of administrators of Maternal and Child Health and crippled children's programs and of qualified individuals who wish to make a combined career as full-time consultant and administrator in the obstetric or pediatric services of health departments or other agencies."

Students taking this work are expected to spend 11 months in residence, an 8 month academic year including the required courses for the Master of Public Health degree, and a summer period devoted to field and clinical work. Clinical facilities are provided through arrangements with the pediatric and obstetric services of The Johns Hopkins Hospital and the Maryland State and Baltimore City Health Departments.

The first small group of students is now in training. Further information can be secured from Paul Harper, M.D., Maternal and Child Health Division, 615 N. Wolfe Street, Baltimore 5, Md.

Comparative Efficiency of Rectal Swabs and Fecal Specimens in Detecting Typhoid and Salmonella Cases and Carriers*

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IN bacillary dysentery the causative organisms are known to be confined chiefly to the lumen and especially to the superficial ulcerations of the large intestine. The ideal method, therefore, for collecting material from cases or carriers of bacillary dysentery for bacteriologic examination would seem to be the application of a swab to the ulcers or inflamed intestinal mucosa while they are being visualized through the sigmoidoscope. This procedure is time consuming and requires the services of a specially trained physician. The development of the " blind " rectal swab technique in which a swab is passed into the rectum either directly [1] or through a lubricated rubber tube [2] has made it possible to collect large numbers of specimens rapidly and to permit the inoculation of culture media without any delay. The superiority of the rectal swab specimen over the passed specimen in the laboratory diagnosis of bacillary dysentery has been demonstrated or indicated by several groups of investigators.[3-8] In this laboratory the use of the rectal swab has become routine in the investigation of dysentery outbreaks.

Because of the rapidity and simplicity with which the rectal swab procedure can be employed, it would be desirable if it could be adapted to surveys made for the purpose of finding cases or carriers of typhoid or *Salmonella* infections. However, it is well known that the excretion of these organisms is from the small intestine and adnexa and not from the lower bowel. There are usually no ulcerations or other lesions of the lower bowel in which the bacilli are harbored and from which they can be cultured. The investigation reported here was, therefore, undertaken to compare the efficiency of the usual type of passed fecal specimen with the rectal swab in the laboratory diagnosis of typhoid and *Salmonella* infections.

The large group of typhoid carriers confined in special wards at the Manteno State Hospital, Manteno, Illinois, provided excellent material for the study. Through the coöperation of the hospital authorities 43 patients, with histories of a typhoid or *Salmonella* carrier state, were made available for the study. The patients were selected, on the basis of previous information, so that persistent intermittent and infrequent shedders were all represented in the group studied. Pre-cathartic rectal swabs and

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TABLE 1

Sequence of Laboratory Findings by Patient

	Pre-Cathartic			*Post-Cathartic*		
	Passed			*Passed*		
Patient	* *Manteno*	* *Chicago*	*R. Swab*	* *Manteno*	* *Chicago*	*R. Swab*
1	TTTT–T	TTT —	——TT–	TTT–TT	TTTTTT	——T–
2	———	—— —	—— —	———	T——	———
3	——	— —	———	——	–T——	———
4	T TTTT	T T TT	TTTTTT	TTTTTT	TTTTTT	TTTTTT
5	—— —	—— —	———	———	–T– ——	———
6	TTTTT–	TTT T	T–TT–	TTTTTT	TTTTTT	TTTTTT
7			——T–	—	—	———
8	TTT–T	TT –T	TTTTT	T–TTTT	TTTT–T	T–TTTT
9	– —	TT TT	———	–TT——	———	——T–
10	T T	T	–T–TT	TTTTT	TTTTT	TTTTTT
11	TTTTT	TT TT	T–TTT	TTTTTT	TTTTTT	TTTTTT
12	——T	—— —	———	———	———	———
13			TT–TT	TTTT T	TTTT –	TTT–T–
14			———	—	—	———
15	———	— —	———	———	—T—	———
16	T TTT	– TT	–T–TTT	TTTTTT	TTTTTT	TTTTTT
17			———	– –	– –	———
18	———	—— —	———	—T—	—T—	———
19	———	— —	———	———	———	———
20	——	— –	———	———	———	———
21	———	—— —	———	———	———	———
22	———	— —	———	– ——	– ——	———
23			———	—T—	—T—	———
24	–		———	—T	–T—	———
25	–	– –	—— –	–T —T	–T ——	–T–T—
26	——	–T –	———	— T—	— T—	–T–T—
27	T———	—— —	—T—	S———	———	——T
28	———	—— —	———	———	———	–T——
29	– —	– –	———	———	———	———
30			———	S S —	S S —	———
31	T —	S SS	–	SS SS	SS SS	T SS TS
32	TTTT	T TT	TTTT	TTTTTT	TTTTTT	TTTTTT
33	TTTTTT	TTT TT	TTTTTT	TTTTTT	TTTTTT	S TTTTTT
34	T— –	—— –	———	—— –	—— –	—— –
35	———	—— —	———	———	———	———
36	———	–T– —	———	—S—	———	———
37	—SS—	S–S SS	S–SSSS	SS–SSS	SS SSS	SSSSS–
38	———	—— —	——	———	———	———
39	———	—— —	–T—	———	–T—	———
40	T TT	– TT	–TTTTT	TT TT	TT TT	–TTTTT
41	T TT	T –T	TTT	TTTT	TTTT	TTTT
42	TTT	TT	–TTTT	TTTTT	TTTTT	TTTTT
43	T		TT	T	T	–T

T = specimen yielded *E. typhosa*
S = specimen yielded *Salmonella*
— = negative findings
* indicates whether examined in Manteno or Chicago laboratories

passed specimens were collected from each patient on the same day. In the evening of the same day the patients were given bile salts and on the following day a saline cathartic was administered. Two rectal swabs and a passed specimen were collected from each patient after the first bowel movement had occurred. An attempt was made to collect six series of pre-cathartic and post-cathartic specimens from each patient. This was not always possible. It was especially difficult to obtain the desired number of pre-cathartic passed specimens from this group of psychotic patients.

Preliminary studies had shown that the best results could be obtained by culturing the rectal swabs in accordance with the following technique: As soon as the swabs were collected, one swab from each patient was plated on Hajna-Perry agar and the other inoculated into a tube containing 2–3 ml. selenite enrichment medium. On the following morning the growth from the latter was streaked on to S. S. medium. In one series the first swab collected was plated directly and the second placed in enrichment medium. This procedure was reversed in alternate series.

The passed fecal specimens were handled according to the following technique: The specimens were collected in paper containers; as soon as specimens were delivered to the laboratory (all were received and plated within 2 hours after collection except a series delivered to our Chicago laboratory for comparative purposes), they were streaked on Hajna-Perry agar and a heavy seeding made into a 12–15 ml. tube of selenite enrichment. On the following morning material from the enrichment media was streaked on to S. S. medium.

Any plate showing suspicious colonies was set aside for further examination. When suspicious colonies were seen on a plate, two or three were picked for further study. Isolated cultures were subjected to extensive biochemical tests and were tested against high titer specific agglutinating sera. All salmonellas isolated were typed.

It should be emphasized that the work was handled in a volume and under the conditions that would be encountered in a survey done in connection with an actual outbreak. Plates were picked without knowledge of the patient's name or what the parallel series of plates revealed. All plates were compared after the picking was completed.

The complete findings are shown in Table 1. From a mere inspection in this table it is apparent that none of the methods is markedly superior when specimens from heavy shedders are examined. However, when the specimens apparently contained few organisms as in those from patients 2, 3, 5, 15, 18, 23, 24, 25, 26, 27, 28 and 39, the efficiency of the passed specimen appears to be greater than the rectal swab. In these instances, also, it appears that the post-cathartic passed specimen yields a higher

TABLE 2

Media Summary — Pre-Cathartic Rectal (234 Specimens)

	No.	Selenite F-SS Only	Selenite F-SS and Hajna-Perry Agar	Hajna-Perry Only
Positive Typhoid	55	12	33	10
Positive Salmonella	5	3	2	..
Positive Typh-Salm	1	..	..	..

TABLE 3

Media Summary—Post-Cathartic Rectal (248 Specimens)

	No.	Selenite F-SS Only	Selenite F-SS and Haina-Perry Agar	Hajna-Perry Only
Positive Typhoid	70	32	33	5
Positive Salmonella	7	2	5	..
Positive Typh-Salm	2	..	..	..

TABLE 4

Media Summary—Pre-Cathartic Specimens (Passed), Chicago (147 Specimens)

	No.	Selenite F-SS Only	Selenite F-SS and Hajna-Perry Agar	Hajna-Perry Only
Positive Typhoid	38	12	17	9
Positive Salmonella	6	2	3	1

TABLE 5

Media Summary—Post-Cathartic Specimens (Passed), Chicago (222 Specimens)

	No.	Selenite F-SS Only	Selenite F-SS and Hajna-Perry Agar	Hajna-Perry Only
Positive Typhoid	78	17	47	14
Positive Salmonella	12	5	7	0

TABLE 6

Type Specimen	Pos.	Neg.	Total
Pre-Cath. Passed	50	99	149
Post-Cath. Passed	53	96	149

P = 0.88

TABLE 7

Type Specimen	Pos.	Neg.	Total
Pre-Cath. Rectal	58	162	220
Post-Cath. Rectal	68	152	220

P = 0.23

TABLE 8

Type Specimen	Pos.	Neg.	Total
Pre-Cath. Rectal	40	103	143
Pre-Cath. Passed	46	97	143

P = 0.47

TABLE 9

Type Specimen	Pos.	Neg.	Total
Post-Cath. Rectal	68	138	206
Post-Cath. Passed	79	127	206

P = 0.23

TABLE 10

Type Specimen	Pos.	Neg.	Total
Pre-Cath. Rectal	52	119	171
Post-Cath. Passed	72	99	171

P = 0.01

percentage of positives than its pre-cathartic counterpart.

The media analyses presented in Tables 2, 3, 4, and 5 are based on the rectal swab results from the laboratory set up at Manteno and the passed specimen findings from our Chicago laboratory. The Chicago laboratory results were used in the latter series because they more nearly approximate the conditions under which specimens are usually received in a public health laboratory. These findings demonstrate again that no single medium is able to pick up all enteric pathogens. They also demonstrate the value of an enrichment medium such as Selenite F.

Because it was impossible to obtain all of the specimens planned, the crude data shown in Table 1 do not present the best comparison of our findings. In Tables 6 to 10 comparison is made of only those specimens which could be definitely paired. In these tables the results from the tetrathionate enrichment series are omitted. Chi-squares have been calculated on all pairs and p-values are shown under each table. All of the differences point in the same direction, i.e., in favor of the passed specimen and those taken post-cathartic, but only one difference is statistically significant, that between the pre-cathartic rectal swab and the post-cathartic passed specimen. The latter comparison is the one of greatest interest to us because the rectal swab is commonly used on patients who have not been given a cathartic while post-cathartic passed specimens are recommended in this type of survey. The marked superiority of the post-cathartic specimen over the pre-cathartic rectal swab under these conditions is striking.

It may be argued that these results may not be conclusive since they were obtained on known carriers. Several months after this part of the study was completed an opportunity presented itself to make another study under field conditions. A case of typhoid occurred

in an institution for mental diseases at K. and the patient was transferred to the institution hospital. The 189 patients on the ward from which this patient was removed were divided into two approximately equal groups. On August 9, 1946, the patients in group one were examined by the rectal swab technique while post-cathartic passed specimens were collected from those in group two. Three days later rectal swabs were collected from the latter group and post-cathartic passed specimens from those in group one. *Eberthella typhosa* was isolated from 7 individuals. From all patients with negative findings two more post-cathartic specimens were collected, all of which gave negative findings.

Analysis of the findings showed that only 3 of the 7 cases or carriers found in this survey yielded positive rectal swab specimens. One of these positives was obtained on a post-cathartic rectal swab, taken through error. All of the original group of post-cathartic specimens on these 7 patients were positive.

Subsequently, beginning about 12 days after the original specimens were collected, two sets of pre- and post-cathartic passed specimens were collected from each of the 7 typhoid cases or carriers found in the original survey. All of the post-cathartic specimens except 1 were found to be positive while 4 of the pre-cathartic specimens were negative. It was noted that the findings were usually positive on all three media combinations employed (S. S., Selinite-S. S. and Hajna-Perry) when post-cathartic specimens were examined, whereas with pre-cathartic specimens positive results were more often obtained, if at all, on a single medium.

DISCUSSION

It is apparent from the results shown above that the post-cathartic passed specimen of feces is a much more satisfactory source of material for bacteriologic examination for typhoid bacilli and salmonellas than the rectal swab although the latter is apparently better as a source of shigellas. This difference might have been predicted from the fact that shigellas are believed to flourish on and in the upper layers of the mucosa of the lower bowel where they can be easily collected by the rectal swab while, on the other hand, *E. typhosa* and the salmonellas are thought to be excreted largely from the small intestine and gall bladder.

By the time typhoid bacilli or salmonellas reach the area which can be reached by the rectal swab they are probably well distributed in the fecal mass. Thus, the rectal swab picks up only a few of these pathogens unless the case or carrier is a very heavy shedder. Enrichment does not aid greatly because the amount of fecal material on the swab is not large in comparison with the amounts of the passed fecal specimen usually employed in seeding the enrichment media.

The effectiveness of both rectal swab and passed specimen was increased in this series if the patient had had a cholegogue and saline cathartic before they were collected. However, in the Manteno study the number of carriers found in the pre- and post-cathartic rectal swab series was identical because carriers found in the pre-cathartic series with the rectal swab technique were missed in the post-cathartic rectal swab series and *vice versa*. However, 11 more carriers were found in the Manteno post-cathartic passed specimen series than in the pre-cathartic group collected by the same technique. On the other hand, 3 of the pre-cathartic passed specimens yielded positives not found in the post-cathartic passed specimen series, so there was a net balance of 8 carriers in favor of the post-cathartic passed specimen series over the similarly collected pre-cathartic series. This was due in large part to the greater number of post-

cathartic specimens that were obtained.

The advantage of the post-cathartic passed specimen over its pre-cathartic counterpart was not significant when paired specimens were studied. In the examination of paired specimens collected during the K. outbreak studied by us, there was again found to be a slight balance in favor of the post-cathartic over the pre-cathartic passed specimen in the ratio of 13 to 10. The difference is again greater than suggested by the figures because inspection of the data shows that the positive findings in the pre-cathartic series were usually found on fewer media combinations, often only one, than in the post-cathartic series.

While the post-cathartic rectal swab yielded much better results than the swab employed without prior administration of a cathartic, we do not believe from our experience that the post-cathartic rectal swab is practicable for general use, especially in psychotic patients. The employment of this procedure in persons who have had a cathartic is disagreeable and, in our opinion, dangerous to the collector of the swab.

The post-cathartic passed specimen has one further advantage over the rectal swab in the laboratory diagnosis of typhoid and salmonellosis. The rectal swab must be cultured immediately after collection in order to prevent drying and, therefore, cannot be used to transport specimens to a distant laboratory by the usual modes of transportation. The post-cathartic passed specimen can, however, be cultured after a considerable delay without loss of efficiency. For example, 205 paired specimens of this type were examined at Manteno State Hospital by one of us (F. F.), and at our Chicago laboratory by another (A. S.) after shipment by Railway Express. The fresh specimens yielded 78 positives while the shipped specimens gave 80 positives. This difference is, of course, ascribable to chance since it would not be expected that the delay would improve the specimens.

The rectal swab can, we believe, be used successfully for one purpose in typhoid and salmonella laboratory work. As indicated above, it was about as effective as the passed specimen in finding heavy shedders of these pathogens. It appears to us that, because of the simplicity and rapidity of the rectal swab procedure, it might well be used as a preliminary to other methods in any large-scale surveys designed to find carriers of enteric pathogens. Used in this way the rectal swab may make it possible to find quickly and easily almost all of the heavy shedders of *E. typhosa* or *Salmonella*. Additional post-cathartic passed specimens can be used to detect the infrequent or light shedder of these organisms. This plan has been adopted by the Illinois Department of Public Health for routine and emergency surveys of institutionalized populations.

SUMMARY AND CONCLUSIONS

Post-cathartic passed specimens are more efficient than rectal swabs as a source of material for the laboratory diagnosis of typhoid and salmonellosis or of the carrier state in these diseases.

The rectal swab is, however, effective in the detection of heavy fecal shedders of *E. typhosa* and *Salmonella* and may be of great value in rapid screening of large population groups if combined with subsequent examinations of post-cathartic passed specimens.

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Susceptibility to Typhus of Rats on Deficient Diets*

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THE observation that there is increased mortality in epidemic typhus when this disease manifests itself in malnourished populations is almost as old as the history of typhus. Despite the antiquity of this observation, almost no experimental work correlating diet and susceptibility to typhus has been done. Some years ago Zinsser and coworkers [1] showed that rats and guinea pigs deprived of all vitamins evinced a greatly increased susceptibility; and Pinkerton and Bessey [2] reported that riboflavin deficiency similarly lowered the resistance of the rat to typhus. More recently, Macchiavello [3] has shown that vitamin C deficiency in the guinea pig also increases susceptibility. In the first two reports the number of animals used was very small and the composition of the diets uncertain in the light of our present knowledge of animal diets.

Various possibilities present themselves as explanations for the observed effect of malnutrition on resistance to typhus in human populations: Resistance might be affected by such factors as the inadequate intake of one specific food factor—protein or a vitamin—or by a low total calorie consumption, or by a diet in which there is a multiple deficiency involving several vitamins.

The work here reported represents part of a study of the effect of various diets on susceptibility to typhus in the rat in which we have attempted not to produce extreme deficiencies, but rather to mimic dietary conditions as they exist or might exist in human populations in various parts of the world.

METHODS AND MATERIALS

Weanling male rats of the Wistar strain were used. Their weights at the start varied between 35 and 60 gm., and they were selected so that the average weights of groups on various diets in the same experiment were the same. Twelve or more rats were placed on each diet. They were housed in individual cages with screened bottoms in an air conditioned room at a temperature of 70 to 74° F. The basic diet was composed of vitamin test casein, sucrose, "Crisco" or "Primex," corn oil, "Cellu" flour, Jones' salt mixture No. 12, choline chloride, vitamin K, and "Oleum percomorphum." The vitamins of the B group were at times included in the ration and at others administered separately as a solution, depending upon the nature of the experiment. In the latter case, they were prepared so that 1 ml. of solution contained the total daily requirement. When rats on a natural diet were used in an experiment, they were fed a mixed ration of oats, Rockland diet, and fresh vegetables.

With a few exceptions, an arbitrary period of 6 weeks on the various diets

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was selected. At the end of this time, in most instances, two-thirds of each group of rats were infected with 1 ml. of murine typhus yolk sac suspension by the intraperitoneal route, while the rest were kept as diet controls. The infectious material was preserved frozen in 1 ml. samples at a temperature of minus 40 to minus 70° C. Its titer was checked by infecting a few control rats on the natural diet or on the complete synthetic diet about a week before the deficient rats were to be infected. For some experiments an infectious dose which killed none of the controls on the preliminary test was selected in order to show up any increased susceptibility in deficient rats. In other experiments, an infectious dose which was lethal to 50 per cent or less of the animals tested was employed. When death occurred in deficient rats, smears of peritoneal exudate, stained by the Macchiavello method, were examined to obtain confirmation that deaths were due to typhus. These usually showed numerous rickettsiae. (It has been reported in the literature that endemic typhus is never a fatal disease in normal rats. This observation was made before the development of methods for the cultivation of rickettsiae in large numbers, and is no longer correct. We have found, using infected yolk sac suspensions, that it is possible, depending upon the dilutions used, to kill rats or to produce an infection from which they recover. Susceptibility decreases with age. When an infection is severe, even when it does not end fatally, rats exhibit a listlessness, anorexia, and marked loss of weight. There may also be "spectacle eyes" and porphyrin whiskers giving the appearance of vitamin deficiency. These symptoms can be observed even in well nourished animals. It is perhaps possible that the rapid multiplication of rickettsiae takes place at the expense of a vitamin, or vitamins, in the host.)

RESULTS

1. *Low Protein and Low Vitamin Diets*—It seemed advisable at the start to determine whether a diet low in protein but otherwise complete, or a diet low in vitamins of the B group but adequate in other respects was more important in reducing resistance to typhus. Four groups of rats were, therefore, fed the following diets *ad lib.*: (1) low protein, adequate vitamins of B group; (2) low protein, low vitamins; (3) adequate protein and vitamins; (4) adequate protein, low vitamins. Choline and vitamins other than those of the B group were fed in adequate amounts to all rats. The compositions of these diets are shown in Table 1. As was to be expected, rats receiving the 5 per cent protein ration did not do well. They either gained very little or fell below their initial weight by the end of the 6 weeks

TABLE 1

Composition of Rat Diets Varying in Protein and B Vitamins

	No. 1	*No. 2*	*No. 3*	*No. 4*
Casein	(5%) 100 gm.	(5%) 100 gm.	(18%) 360 gm.	(18%) 360 gm.
Sucrose	1,496 gm.	1,496 gm.	1,236 gm.	1,236 gm.
Jones Salt Mixt. No. 12 *	80 gm.	80 gm.	80 gm.	80 gm.
"Cellu" Flour	80 gm.	80 gm.	80 gm.	80 gm.
Vitamin Mixt.†	744 mg.	74.4 mg.	744 mg.	74.4 mg.
Choline Chloride	4 gm.	4 gm.	4 gm.	4 gm.
"Primex"	200 gm.	200 gm.	200 gm.	200 gm.
Corn Oil	40 gm.	40 gm.	40 gm.	40 gm.
ADE Concentrate	2 ml.	2 ml.	2 ml.	2 ml.
Vitamin K	20 mg.	20 mg.	20 mg.	20 mg.

* Jones and Foster, *J. Nutrition*, 24:245 (Sept.), 1942
† Skeggs and Wright, *J. Nutrition*, 32:375 (Oct.), 1946

period. This occurred whether adequate vitamins were present or not. The gain of rats on the complete diet (diet 3 in Table 1) was between 70 and 120 gm., while rats receiving adequate protein and low vitamins (diet 4) gained between 25 and 40 gm. This experiment was performed four times. As will be seen from the two experiments shown in Tables 2 and 3, deaths commenced to occur on the third or fourth day after intraperitoneal injection with murine typhus. The difference in susceptibility of the rats on diets 1, 2, and 4 was not striking, whereas the rats on the complete diet (diet 3) showed a much higher resistance. This was found to be partial or complete depending upon the strength of the inoculum.

TABLE 2

Exp. No. 3. Effect of Low Protein and Low Vitamin Diets on Susceptibility of Rats to Murine Typhus--Results of Infection

Diet No.	No. of Rats Infected	Day of Death After Infection *	No. of Rats Dead
1	8	55566667	8/8
2	8	3333344 6	8/8
3	8	----------	0/8
4	8	4 5555666	8/8

* Infecting dose less than 1 m.l.d.

Under the conditions of the experiments just described, no conclusion could be drawn as to the *relative* importance of protein and the B group of vitamins in the resistance of the deficient rats to typhus, even though their diets resembled those that might be consumed by human populations. Deficiency of protein or of B vitamins each appeared to increase susceptibility. It was realized that the rats receiving the deficient diets ate less than those supplied with a high intake of protein and vitamins, and that paired feeding experiments would be necessary to rule out the effect of inadequate food intake.

TABLE 3

Exp. No. 4. Effect of Low Protein and Low Vitamin Diets on Susceptibility of Rats to Murine Typhus--Results of Infection

Diet No.	No. of Rats Infected	Day of Death After Infection *	No. of Rats Dead
1	17	4444444445555666	17/17
2	14	44444444444555	14/14
3	23	5666679999	10/23
4	20	44444555555555566667	20/20

* Infecting dose slightly less than 1 $l.d._{50}$

To this end, 2 groups of 12 rats each were placed on diets 3, and 4, as in the experiments just discussed, but with two changes: First, the rats receiving diet 3, the complete diet, were given *double* the quantity of vitamins of the B group (exclusive of choline) in their diet; and second, they were pair-fed with rats fed diet 4; so that in this experiment there were 2 groups of rats consuming the same total amount of food daily (about 7 gm.) but one received twice the amount, and the other one-tenth the quantity, of B vitamins considered optimal. The mortality in these two groups following infection with typhus is shown in Table 4. As can be seen, 9 of the 11 rats on the diet containing one-tenth the quantity of B vitamins succumbed on

TABLE 4

Results Following Infection in Rats Subjected to Diets Differing in Quantity of Vitamins of B Group

Diet No.	Quantity of B Vitamins	No. of Rats Infected *	Day of Death	No. of Rats Dead
3	double adequate	11 †	----------889	3/11
4	1/10 adequate	11	555556677	9/11

* Infecting does less than 1 $l.d._{50}$.
† One rat dead of intercurrent infection before inoculation.

the 5th, 6th, and 7th days. Three of those on a double portion of vitamins died, but death was delayed. This experiment would lead one to conclude that curtailment of the B group of vitamins renders rats much more susceptible to infection with typhus. As a check, we are carrying out feeding experiments in which adequate vitamins are given separately while the quantity of protein is varied.

2. *Individual Vitamins of B Group*—Our next object was to determine which of the vitamins in the B-complex was important to resistance. In these experiments all rats were fed the complete diet *ad lib.* exclusive of the B group of vitamins. The latter were fed separately each day in caster cups to insure their consumption. Table 5 shows the quantities of vitamins fed to control rats. To determine the effect of deficiencies of vitamins of this group, one member at a time was reduced to one-twentieth the optimal level. This was a purely arbitrary restriction which resulted in an impaired gain in weight in some experiments without producing, in most instances, any striking deficiency symptoms. It was found that no increased susceptibility resulted when choline, nicotinic acid, pyridoxine, or para aminobenzoic acid were reduced to one-twentieth optimal levels, but that reducing pantothenic acid, riboflavin, or thiamin to this level resulted in mortality which was greater than that of controls. It was surprising to find that 3 vitamins could have this effect. In order to bring out the relative importance of these 3 vitamins and to make the results clear cut, they were reduced to one-fortieth the optimal level and tested simultaneously. The results of such an experiment are shown in Table 6. Deaths occurred first among pantothenic acid and thiamin deficient rats and were delayed in the riboflavin deficient group. It remains to be shown whether a deficiency of all 3 of these vitamins in the same group of rats results in greater susceptibility than the single deficiencies. Pyridoxine, choline, or nicotinic acid reduced to one-fortieth the optimal level were without effect. The result of inositol deficiency is still to be investigated, though since it is not essential for the rat, susceptibility probably will not be increased. Obviously, the therapeutic effectiveness of pantothenic acid, riboflavin, and thiamin must be tested in infected rats.

TABLE 5

Quantities of Vitamins of B Group Given Daily to Rats on Normal Diet

Vitamin	*Gamma/Day*
Thiamin	80
Pantothenic Acid	440
Pyridoxine	80
Para aminobenzoic acid	400
Niacin	400
Riboflavin	160
Inositol	2,160

It was noted that the response to infection of rats on the deficient diets frequently was not typical. As was observed by Zinsser and coworkers,[1] the deficient animals usually had no rise in

TABLE 6

Results Following Infection in Rats Subjected to Diets Low in Individual Vitamins of B Group

Level of Vitamin in Diet	*Gamma Day*	*Day of Death After Infection* *	*No. of Rats Dead*
1/40 optimal pantothenic acid	11	4 6 6 9	4/8
1/40 optimal pyridoxine	2	– – – – – – – –	0/8
1/40 optimal riboflavin	4	8 8 9 9 9	5/8
1/40 optimal thiamin	2	5 5 5 6 6 6 8	7/8
All B vitamins optimal	..	– – – – – – – –	0/8

* Infecting dose less than 1 m.l.d.

temperature. We found, in addition, that there was seldom any enlargement of the spleen or scrotal swelling.

Other experiments involving less specific factors have also been done, such as the addition of liver to the complete synthetic diet, and the comparison of the natural with the synthetic diet. The inclusion of 1 per cent liver powder in the complete synthetic diet did not increase the resistance of the animals to typhus.

3. *Natural and Synthetic Diets*—In preliminary tests of infectious yolk sac material, it was observed that when rats on a natural diet were used they sometimes withstood doses that proved fatal to animals on the complete synthetic diet. This was surprising in view of the fact that the latter diet contained all known factors in optimal quantities. To test the validity of this observation, 26 weanling rats were placed on the natural diet for a period of 2 weeks, at the end of which time 12 of the 26 were put on the complete synthetic ration, the rest being kept on the natural diet. After a further period of 4 weeks both groups were infected. The rats on the synthetic diet weighed on the average 14 gm. more than those on the natural diet. About 3 days following infection, the animals on the synthetic diet exhibited the listlessness, irritability, anorexia, and loss of weight typical of a severe typhus infection in the rat, and 2 of the 12 died. The appearance of the animals on the natural diet was in striking contrast. They were alert; they ate well; and there were no deaths. One can perhaps postulate that there is an unrecognized food factor supplied by the natural diet, or that the cruder diet promotes the synthesis of some unknown factor by the bacterial flora of the intestine which increases resistance.

DISCUSSION

Some explanation for the observed connection between typhus and famine has been arrived at in the foregoing experiments, if the results obtained with rats can be applied to man. At the start of the work it appeared that a diet low in protein and a diet low in vitamins of the B group each increased susceptibility. By means of paired feeding experiments it was shown that the vitamins were the important factor. The increased susceptibility of rats on a low protein diet can be explained by the fact that they ate very little and, therefore, did not get their daily vitamin requirement. This condition without doubt has its parallel in devastated countries where populations subsist on monotonous and inadequate diets which act as deterrents to appetite. Of the 3 vitamins which specifically increase the susceptibility of the rat to typhus, thiamin is known to be a great stimulant to appetite. If it should be lacking in the human diet, inadequate consumption of riboflavin and pantothenic acid might follow. It is interesting to note that the same foods are often the best sources of these 3 vitamins, and they are foods which are seldom available to the victims of war and poverty.

SUMMARY

1. The susceptibility of rats to typhus was increased by the following types of deficient diet: (1) low protein, whether containing adequate amounts of vitamins of the B group or not; (2) a diet normal in protein, containing one-tenth the quantity of vitamins of the B group considered optimal; (3) a diet complete except for reduced pantothenic acid; (4) a diet complete except for reduced riboflavin; (5) a diet complete except for reduced thiamin.

2. Rats on a natural laboratory diet were less susceptible than those fed a complete synthetic diet.

3. No increased susceptibility was observed when pyridoxine, nicotinic acid, choline, or para aminobenzoic acid were reduced in otherwise complete diets.

4. The addition of 1 per cent liver powder to the complete synthetic diet did not increase the resistance of the rats to typhus.

NOTE: The suggestions of Dr. J. H. Jones relating to the composition of the basic rat diet are gratefully acknowledged.

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Specialty Board in Preventive Medicine

On February 3, a forward step toward professional recognition of preventive medicine as a distinct medical specialty was made by the formation of an "Interim Board" of Preventive Medicine in the Army, Navy, and Public Health Service, according to an announcement made jointly by the Surgeons General of the three Services.

Six civilian authorities and one representative each of the three services were designated to form the Interim Board. The six civilian representatives are: Dr. Gaylord W. Anderson, Director, University of Minnesota School of Public Health; Dr. Thomas Francis, Jr., Professor of Epidemiology, University of Michigan School of Public Health; Dr. Wilton L. Halverson, California State Director of Public Health; Dr. Harry S. Mustard, New York City Health Commissioner; Dr. Hugo Muench, Assistant Dean, Harvard School of Public Health; Dr. Ernest L. Stebbins, Director, Johns Hopkins University School of Hygiene and Public Health. Chiefs of the Preventive Medicine Divisions of the Army and Navy, and an officer selected by the Surgeon General of the Public Health Service, complete the roster. These are: Captain Otto L. Burton, U. S. Navy; Dr. James Crabtree, U. S. Public Health Service; and Colonel Tom F. Whayne, U. S. Army. Dr. Ernest L. Stebbins was elected Chairman of the Board which began drafting a preliminary bill of requirements for certification.

The Interim Board was formed chiefly for the purpose of setting up certification requirements for medical officers in the three services seeking to qualify as specialists in preventive medicine. This coöperative effort of the services will, however, also give considerable impetus to a demand for creation of an American Board of Preventive Medicine and Public Health, to take its place along with the 16 medical specialty boards already in existence. The three Services have expressed their intent to discontinue the Interim Specialty Board as soon as a civilian specialty board is established.

The Committee on Professional Education of the American Public Health Association and the Section on Preventive and Industrial Medicine and Public Health of the American Medical Association have recommended that an Organizing Committee for an American Board of Physicians in Preventive Medicine and Public Health be established, consisting of members representing the American Medical Association, the American Public Health Association, the Canadian Public Health Association, the Association of Schools of Public Health, and the Southern Medical Association. Representatives from these organizations have recently been appointed. Further progress will be reported to our *Journal* readers as new developments take place.

The Epidemiology of Rheumatic Fever; Its Public Health Aspects*

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NEXT to tuberculosis and syphilis, rheumatic fever, a post-streptococcal syndrome, is our third most common infectious disease. Little has been done in the promotion of public health measures to control this disease, for several obvious reasons. These are three in number; first, the etiology of rheumatic fever has not been clearly understood, in spite of the fairly well known fact that rheumatic fever and the hemolytic streptococcus infections are related; second, there is no specific diagnostic test for rheumatic fever comparable to the tuberculin test for tuberculosis or the Wassermann test for syphilis; and, third, there has been no general acceptance of any standard program of preventive measures.

The understanding of the epidemiology of rheumatic faver is important because it is the foremost cause of death in individuals under the age of 20 years. Infantile paralysis, while more dramatic in its onset and far more widely publicized, causes less than one-tenth as many deaths annually. The subject of the epidemology of rheumatic fever has been well covered by Paul's monograph published in 1943, and more recent statistical studies have confirmed his findings, with additional emphasis on the wide distribution of the disease. Studies made upon young men who were rejected for military service because of cardiac disease during 1942 and 1943 revealed rheumatic valvular heart disease as comprising 51 per cent of the total number in Boston, 70.3 per cent in Chicago, 64.4 per cent in New York, 65.9 per cent in Philadelphia, and 39.6 per cent in San Francisco. Armstrong and Wheatley[1] offered evidence of "hereditary" susceptibility to rheumatic fever which is said to indicate a Mendelian recessive character. It is not clear how much susceptibility may be due to the state of nutrition and environment shared by family groups rather than to heredity.

The close relationship between hemolytic streptococcus infection and the rheumatic state has been demonstrated by a number of observations. These have been carefully evaluated by Rautz and his associates.[7] Rheumatic fever follows known hemolytic streptococcus infection, especially when involving the upper respiratory tract. Epidemics of rheumatic fever have often succeeded outbreaks of scarlet fever and other forms of streptococcal sore throat. Reactivation of the rheumatic state frequently develops when a new infection by the hemolytic streptococcus occurs in individuals who have had rheumatic fever previously. High titers of various antistreptococcal antibodies and cutaneous hypersensitivity to products of hemolytic streptococci are usually demonstrable by immunological means in those suffering from active rheumatic fever. In the rheumatic fever studies among military personnel, it was noted that the most

* Read before the Public Health Section, California State Medical Association, Los Angeles, Calif., May 2, 1947.

constant epidemiological finding was exposure to hemolytic streptococci.

In the past it has been accepted that rheumatic fever is a disease of the temperate zone. Investigations in more tropical regions have thrown doubt on this conclusion. Suarez reported that rheumatic heart disease in Puerto Rico amounted to 20 per cent of all cardiovascular disorders. Sampson, *et al.*[9] found rheumatic fever in the warm, dry sections of California in a degree comparable to cities with temperate climates, such as Cincinnati and San Francisco. Medical officers report the frequency of active rheumatic fever in the New Hebrides and in the Samoan Islands. Climate does not appear to be a large factor in the epidemiology of rheumatic fever. In military installations it was apparent that two circumstances were prominent in the rapid spread of hemolytic streptococcal disease; one, the concentration of large numbers of people within relatively small areas; the other, the constant introduction of new members to the group. Since military installations, especially training stations, are necessarily subjected to these two circumstances, they become ideal soil for epidemics. Clinical observers have found that they are able to predict with fair accuracy the number of cases of rheumatic fever which can be expected to develop after an outbreak of scarlet fever or of tonsillitis in a training camp. Five to 10 per cent of these patients developed recognizable rheumatic fever in such camps.

Factors commonly held responsible for their part in the epidemiology of rheumatic fever, such as climate, precipitation, marked variations in temperature, and familial susceptibility, may be significant only because under these conditions there is likely to be crowding in a limited space, lack of sunlight, and limitation of diet which may create the soil for epidemic streptococcal throat infections.

Undoubtedly a great many cases of streptococcal throat infections are overlooked. A mild streptococcic pharyngitis may be dismissed lightly after a few days, even if it has come to the attention of a physician. This is particularly true in the milder climates where more severe manifestations of the streptococcic throat infections and even those of rheumatic fever may be minimal or absent. An active rheumatic state is frequently found without any joint manifestations. This is common in the warmer climates, but may occur anywhere; and the lack of characteristic arthropathy allows much severe cardiac damage to develop unnoticed. More important than this, rheumatic fever is not classed as a reportable disease in many states. This tends to keep the medical profession in ignorance of its existence in such areas.

Wheatley[1] calls attention to the seasonal incidence which has always been noted as a striking characteristic of rheumatic fever. April is the high month, with September and October the low months. This may be regarded as another aspect of a disease whose cause is dependent upon respiratory infections, and which follows the peak of the streptococcal curve by several weeks. This pattern has been altered where military installations provide the crowding and high turnover which give rise to outbreaks of streptococcal infections regardless of seasons. Therefore, it may be stated that where conditions are conducive to hemolytic streptococcal epidemics, rheumatic fever in epidemic form will follow. The epidemiology of rheumatic fever is essentially the same as that of hemolytic streptococcal throat infections.

In a review of the histories of 1,046 rheumatic fever cases which developed during military service, several facts became clear. First, the state from which the youth came was of less importance than the incidence of respiratory infections in the training camp to which he

was sent; second, youths from the urban districts were slightly more prone to develop rheumatic fever than were trainees from the rural sections; third, tonsillectomy performed prior to military service did not materially protect the individual from developing the disease. These facts tend to reinforce Paul's belief that rheumatic fever is a "crowd disease." Paul pointed out that rheumatic fever is more prevalent in urban than it is in rural children, more frequent in river-side damp and wet homes, and occurs oftener in dwellings where crowding, poor ventilation, uncleanliness, and poor nutrition are found.

Much has been written about the type of individual who develops rheumatic fever. The observers of over 10,000 rheumatic fever patients in one Naval installation were unable to find any one type which predominated. The dark complexioned, swarthy individual developed the disease as frequently as did the often described red or auburn-haired, freckle-faced, thin individual. No particular stock was found to be more susceptible. The Negro race, however, differs in that there is an increased vulnerability to the ravages of rheumatic fever after it has been acquired, rather than a greater tendency to develop the disease.

A hereditary susceptibility to rheumatic fever has been believed to determine the incidence of rheumatic fever. This view, beginning with Cheadle [3] 46 years ago and supported by considerable new work by Wilson and Schweitzer,[10-11] has been attributed to a single autosomal recessive gene which, when distributed among the population, has made the bearer susceptible to the disease. It is true, as shown by many workers—most recently by Gould and Read—that children of rheumatic parents have higher attack rates than do the children of non-rheumatic parents. The problem of hereditary susceptibility finally comes down to an analysis of family incidence. In a very carefully controlled study, the writer [12] and his associates interviewed 3,594 rheumatic fever patients and 1,397 non-rheumatic patients in an attempt to answer this question. An opportunity presented itself to study this large number of patients from the standpoint of the familial relationship in those individuals who developed rheumatic fever before separation from the family and in those who developed the disease after separation from the family unit. The total number of individuals studied was 4,991. Table 1 shows the number of individuals in each of the following groups.

TABLE 1

Number of Patients Studied in the Various Groups

Group	Number
Developed rheumatic fever after leaving home	3,611
Did not develop rheumatic fever after leaving home	
Tuberculous cases at Corona Naval Hospital	519
Medical and surgical patients at Birmingham General Hospital	607
Intern and resident physicians at a civilian hospital	254

The question arose as to whether these individuals were likely to have been equally well informed concerning the occurrence of rheumatic fever in members of their families. It was suspected that individuals who had not had the disease at any time might be relatively uninformed in this respect by comparison with those who had developed the disease, unless the individual was himself a physician. On review of the data this was found to be the case; among those who had not themselves had the disease, non-medical individuals reported a significantly lower familial incidence than did physicians. It was, therefore, necessary to exclude from this analysis of the effects of familial rheumatic fever all of those individuals who had not had the disease themselves and were not themselves physicians, the number of cases so excluded on the basis of inadequate information being 1,082.

With respect to the influence of one attack of the disease upon the development of later attacks after leaving home, however, there was no reason to suppose the knowledge of an earlier attack to have been inadequate in those failing to develop a later attack or particularly sufficient in those who did; all 4,991 cases were therefore used in this analysis.

In the "informed groups," as defined above, a study was made of the relationship between a positive family history of rheumatic fever and personal development of the disease while still in contact with the family. The results, in the form of a contingency table, are shown in Table 2.

TABLE 2

Relationship between Family History and Personal Attack before Leaving Family

	Personal History Before Separation from Family	
Family history	*Positive*	*Negative*
Positive	369	258
Negative	551	2731

It is seen that these results could not possibly have been due solely to chance, and that there is a definite tendency for the individual with a positive family history to have the disease while still in contact with his famly.

A study was next made of the relationship between a positive family history and the personal development of the disease in the individual after separation from his family. The results, in the form of a contingency table, are shown in Table 3.

TABLE 3

Relationship between Family History and Personal Attack after Leaving Family

	Personal History After Separation from Family	
Family history	*Positive*	*Negative*
Positive	582	45
Negative	3,029	253

It is noted that these results could easily have been due solely to chance, and that there is, therefore, no relationship between family history and the personal development of the disease after separation from the family. This same conclusion is reached when the cases are separately studied according to their own past personal histories.

From Tables 2 and 3 it is concluded that a positive family history is important only so long as the individual remains in contact with the family, and that the positive family history has no influence upon the subsequent development of the disease. It is, therefore, possible to study the role of a past personal history upon the risk of developing rheumatic fever without regard to family history. The reason for excluding the relatively "uninformed group" from such a study is now no longer present, since they are presumed to be uninformed only in respect to the family history.

Table 4, therefore, shows for all individuals the relationship between personal past history of rheumatic fever and the later development of the disease.

TABLE 4

Relationship between Personal Past History of Rheumatic Fever and the Later Development of the Disease

	Later Development of Rheumatic Fever	
Past History of Rheumatic Fever	*Yes*	*No*
Positive	861	59
Negative	2,750	1,321

This result could not have been due solely to chance, and it is, therefore, clear that a positive personal history does tend to influence the patient to the later development of the disease. It is obvious, therefore, first, that an attack of rheumatic fever earlier in life tends to facilitate a later attack, but that this difference is not great; and, second, that the occurrence of rheumatic fever in the family increases the risk of the individual developing the disease while still in contact with the family, but not after he is separated from the family. There does not, therefore, appear to be a strong and inherited susceptibility. The oc-

currence of multiple family cases could be explained either on the basis of common environment or contagion.

Therefore, it would seem fair to conclude that the high prevalence of rheumatic fever is not hereditary, but domiciliary. Environmental factors in the home play a large part in timing the onset of rheumatic fever after family epidemics of streptococcal infections such as scarlet fever. From the standpoint of epidemiology, rheumatic fever is a crowd disease following closely upon *Streptococcus hemolyticus* infection. The higher incidence in the poorer homes, in cities and in cold, damp climates is due to contact with the hemolytic streptococcus. The epidemiology of rheumatic fever thus becomes analogous to the epidemiology of tuberculosis.

It is clear that to eliminate rheumatic fever and related disorders associated with the post-streptococcal state, a complete suppression of infection in human beings by the hemolytic streptococcus is necessary. Rautz[7] stressed this point in a paper read before this Section 2 years ago. The overwhelming magnitude of the problem needs to be emphasized to create sufficient interest in professional and lay groups. When it is realized that rheumatic fever and valvular heart disease are the most frequent cause of death between the ages of 5 and 24 years, then an approach to this problem will be made comparable to the successful control of tuberculosis.

The first public health measure to be taken is education. Physicians and associated professional personnel must be informed of the fact that every patient with a hemolytic streptococcal throat infection is a potential rheumatic fever subject. Perhaps it would be wise not to use the term rheumatic fever and to talk about the post-streptococcal state. Physicians, nurses, teachers, and parents should know this fact and be alert to find the child who is pale, nervous, and easily fatigued; and in the presence of these symptoms to suspect the rheumatic state.

The second public health measure is that of case finding. California is the 46th state in the number of cases of rheumatic fever reported; yet it is the 18th in the number of rheumatic fever and rheumatic heart disease deaths. The frequency of the rheumatic state is comparable in this climate to that of other cities, such as Cincinnati, as shown by the studies of Sampson and his associates,[9] as well as by studies now in progress by the author. Again it must be emphasized that case finding will depend largely upon the education of physicians, nurses, and teachers, as well as parents. Local facilities for the specialized study of suspected cases should be set up. In Pasadena, Calif., alert pediatricians, a wide awake school physician and an intelligent heart committee of the Tuberculosis and Health Association have joined in a program of case finding, and a diagnostic clinic with follow-up care.

The third and probably the most difficult public health measure is the control of streptococcus epidemics. Isolation of all cases with positive streptococcic throat cultures has been effective in limiting epidemics in military installations. Most public health departments require the isolation of the scarlet fever patient, yet do not isolate patients who do not develop a rash. Also, since it is known that virulent hemolytic streptococci exist in the nasopharynx for many weeks after the acute manifestations are past, and that many healthy carriers harbor the same virulent streptococci, the desirability of isolating all patients with suspected streptococcal infections in the hope of preventing the spread of the disease can be realized.

The control of healthy streptococcus carriers becomes most difficult, since at varying seasons of the year from 5 to 50 per cent of the population may harbor these organisms in the nasopharynx. So

far, no satisfactory method for the elimination of the hemolytic streptococcus from the throat has been found. The local application of the sulfonamides and the antibiotics have not proved of value. Large dosages of penicillin administered parenterally help to reduce the invasiveness of the organisms, but do not eradicate them from the throat. Nasal carriers are more dangerous than are pharyngeal carriers. The prohibition of carriers from entering kitchens, schools, and places of crowding may be of value.

The decontamination of air is a valuable method for the control of hemolytic streptococcus epidemics. Three methods may be employed. First, the dissemination of the hemolytic streptococci may be prevented by the oiling of floors and of bedding. It has been demonstrated that it is possible to reduce greatly the bacterial count in the air from secondary human reservoirs when sweeping, dusting, and bed making are done with due regard to the setting up of air currents and using oils to hold the organisms in a given location. Second, the bactericidal properties of ultra-violet light definitely reduce the bacteria count. Third, the action of glycols vaporized into the room helps to sterilize the air. All of these methods are undergoing careful evaluation. It is impossible to estimate their full effectiveness in the reduction of the transmission of the streptococcus. The methods are cumbersome, expensive, and inapplicable except where large numbers of persons are congregated for work or amusement in closed spaces, such as schools, factories, theaters, and military establishments. These methods cannot be expected to control the transfer of the hemolytic streptococcus from the healthy or diseased carrier when brought in contact with a susceptible individual.

Since these methods do not prevent the transmission of the hemolytic streptococcus, it is necessary to seek means of preventing the tissue invasion of the organisms and the establishment of the disease in the nasopharynx.

A method to raise the resistance of the individual to infection by the streptococcus must be found. General resistance is increased by adequate nutrition and the avoidance of fatigue and exposure. The importance of proper food, adequate housing, and protection from sudden temperature changes need not be emphasized here.

Tonsillectomy is not a protection against tissue invasion. In a recent study of 1,046 rheumatic fever patients, 46 per cent had had a tonsillectomy performed prior to the onset of the rheumatic fever. It is also true that tonsillectomy does not insure the patient against reactivation of rheumatic fever, if the pharynx is invaded by the hemolytic streptococcus.

Chemoprophylaxis has been utilized in civilian groups and in military establishments. It was demonstrated that the sulfonamides were effective prophylactic agents for the prevention of tissue invasion by the hemolytic streptococcus, as reported by the Bureau of Medicine and Surgery of the Navy Department [2] in 1944 and by Holbrook [4] in the Army Air Force. The daily administration of one gm. of sulfadiazine reduced the incidence of suppurative hemolytic throat infections 80 per cent and moderately decreased the number of rheumatic fever patients.

In civilian practice, a similar program in the Children's Heart Hospital of Philadelphia, as reported by Stroud,[5] clearly showed that reactivation of the rheumatic state was greatly reduced.

Recent studies, however, have shown that sulfonamide-resistant strains of the Group A hemolytic streptococci are prevalent in various populations and that their spread is not affected by chemoprophylaxis. A great deal of study is indicated in this field, in view of the work of Rich [8] in producing rheumatic-

like histologic lesions by sensitization with sulfonilamide. Especially is this true, considered in the light of the Army Air Force experience, where frequent reactions to the sulfonilamides were caused by repeated administration of the drug when given in prophylactic dosage to the Army Air Force personnel. Toxic reactions are few if the drug is withdrawn when the early symptoms of hypersensitivity appear. Severe reactions occur if the drug is administered repeatedly to sensitized individuals. Therefore, in every epidemic the streptococcus should be tested *in vitro* to find out if the epidemic strain is definitely inhibited by low concentrations of the drug. It is of more importance that the drug should be withheld from all persons who are sensitive to sulfonilamide, and that all persons receiving the drug be readily available for frequent examinations by the physician.

Biologic prophylaxis with the use of sera and vaccines has so far proved unsatisfactory. Immunity is type-specific, and polyvalent vaccines are required. The real danger in inoculation of human beings by these organisms is the production of streptococcal tissue hypersensitivity, which may increase the possibility of causing post-streptococcal complications such as rheumatic fever, if and when suppurative streptococcal invasion of the throat occurs.

Antibiotic prophylaxis is expensive and, as yet, impractical. Penicillin therapy at the time of the invasion of the tissues of the throat shortens the illness and has proved to be the best preventive of the post-streptococcal complications and of the reactivation of quiescent rheumatic fever.

If a substance which acts like the salicylates, in a very effective way, can be found, then the sensitizing reaction will be blocked. The hope of investigators working at the present time, is to find a substance which will prevent the antigen of the streptococcus from sensitizing the host, and thus block or prevent the post-streptococcal state.

SUMMARY

1. The epidemiology of rheumatic fever is the epidemiology of the Group A hemolytic streptococcus.

2. Respiratory disease caused by the hemolytic streptococcus predisposes to the post-streptococcal non-suppurative complications.

3. Rheumatic fever is a contact disease, and not primarily due to an inherited susceptibility to the disease.

4. The public health measures for the control of rheumatic fever are similar to those instituted so successfully in the control of tuberculosis.

5. Isolation, control of carriers, air sterilization, and possibly chemoprophylaxis are measures necessary for the prevention of epidemics.

6. The chief problem is the protection against, or the elimination of, infection by streptococci from the whole population.

7. A blocking agent, to prevent the development of the post-streptococcal syndrome, i.e., rheumatic fever, is a logical attack upon the problem.

8. The solution of these problems is the first step in the prevention of rheumatic heart disease, and perhaps in the prevention of the wide-spread vascular diseases, as well.

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General Reactions of Mothers and Nurses to Rooming-in

Observations Based on Experience in a Four Bed Rooming-in Unit in the Grace-New Haven Community Hospital (University Service) *

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ROOMING-IN is the term used for the hospital arrangement whereby a mother may have her baby in a crib beside her bed. This paper summarizes the general reactions of mothers and nurses to rooming-in as carried on during the past 11 months on the maternity ward of the Grace-New Haven Hospital in the so-called Rooming-in Unit. The Unit is housed in the maternity ward solarium which has been partitioned off into a four bed, semi-private ward with attached four cubicle nursery and doctors' and nurses' office. The baby's crib is usually by the mother's bedside but may be moved to the nursery at the end of the room as occasion arises. The upper part of each partition is glass with draw curtains, so that there may be visibility or seclusion as desired. The partitions stop three feet short of the ceiling for ventilation purposes. The ceiling and side walls of the nursery are treated with acoustic-celotex to reduce the intensity of sounds and noises. The room is cheery and attractive. The Rooming-in Unit is thus a comfortable division of hospital space wherein four mothers and their new-born babies may be cared for together under unified nursing and medical supervision, and where each mother may observe her baby to her heart's content and learn to take care of him before she leaves the hospital.

As hospitalization for maternity cases has increased during the last 25 years, many mothers have felt the lack of opportunity to get acquainted with their babies during the lying-in period. They have subsequently admitted feeling panicky and helpless in dealing with the baby immediately after coming home from the hospital. During this same period, some physicians who have had the opportunity to study feeding problems and other behavior disturbances of infants and young children, together with the neuro-psychiatric disturbances of adults, have expressed the opinion that the separate care of maternity and new-born patients in the hospital and the extension of the hospital's rigid schedule into the home has offered a favorable medium for the growth of unnecessary conflict between mother and child. Furthermore, mothers from all sections of the country who have wanted to nurse their babies as a natural maternal process have felt thwarted by the disinterested attitude of the hospital medical and nursing staffs in supporting their wish to nurse. They have felt both puzzled and hurt by their failure to provide what they had reason to con-

* Presented before the Maternal and Child Health Section of the American Public Health Association at the Seventy-fifth Annual Meeting in Atlantic City, N. J., October 6, 1947.

sider was the best food for their infants. Some physicians (pediatricians, psychiatrists, and obstetricians) listening to such comments and complaints from intelligent parents, have gained a conviction that the hospital's institutional need for regularity and regime has blocked a recognition of the mutual needs of mothers and new-born babies within the hospital.

Since the major part of the education of physicians and nurses is in hospitals, and since approximately 80 per cent of the babies born throughout the United States and 90 per cent of the city born babies are at present delivered in hospitals,[1] hospital practices have very far-reaching effects, and also very profound effects, for they bear the stamp of the acme of medical authority. Physicians, nurses, and parents educated in the hospital to a firm belief, both in the nursery segregation of new-born infants and in strict routine and regularity as a correct procedure for infant care, have had little reason to question either until practical experience or further education or both has taught and convinced them otherwise. There are now throughout the country parents, physicians, and nurses who singly or in groups are expressing other convictions.[2-7] Good hospitals, they are saying, have certain advantages over homes for safety in maternal and new-born care; good homes have certain advantages over hospitals in naturalness and comfort. Protection from infection and protection from discomfort may be equally essential for the baby's happy, healthy development and for the mother's ability to give adequate care to her child. Cannot the advantages of safety and home-like comfort be combined in the hospital for the welfare of normal healthy mothers and infants, and for the more realistic education of parents, physicians, and nurses in the interrelationship of maternal and infant needs?

The Rooming-in Unit on the University Service of the Grace-New Haven Community Hospital is the joint cooperative attempt of the Department of Pediatrics and the Department of Obstetrics and Gynecology of the Yale University School of Medicine, of the Yale School of Nursing, and of the Hospital Administration to answer that question.

REACTIONS OF MOTHERS

In discussing the reactions of mothers we will consider first the reactions of prospective mothers to the idea of rooming-in. During the first 3 months of our work the existence of the Unit was not generally known. We could, therefore, question the expectant mothers in Prenatal Clinic with reasonable assurance of a spontaneous response from them, unbiased by previous hearsay or consideration. Our initial phrasing of the question was as follows:

> In our experience we have found that some women think that they might prefer to have the baby in the room with them in the hospital. Other women would rather have their babies in the nursery and brought to them at regular feeding hours. Which would you prefer?

This question was asked only of the mothers who in a preliminary or screening interview had signified their wish to breast feed, since we were studying rooming-in with special reference to the type of woman who wanted help and encouragement from the hospital in undertaking to breast feed her baby. There were many immediate smiling responses to the suggested idea of having the baby close to the mother's bed; there were some incredulous, hesitant, dubious responses, and a few immediate negative responses. Table 1 figures from the first 8 months indicate, however, that of the mothers who looked forward to nursing the baby, more favored the idea of rooming-in than disapproved of it.

As a further check on the reaction of expectant mothers to the idea of room-

TABLE 1

Expectant mothers offered the possibility of rooming-in arrangement	235
Wanting rooming-in	175
Did not want rooming-in	60

ing-in during the last 3 months (from July 1 to September 30, 1947) every mother interviewed in the Prenatal Clinic by a member of the Rooming-in staff has been asked whether she would like to have her baby beside her bed if it were possible. Table 2 figures indicate that more than half of the expectant mothers (whether they wanted to breast feed or bottle feed their babies) are positively in favor of the idea, that a quarter of the mothers are definitely opposed, and the remaining one-fifth of the total group are indifferent.

TABLE 2

Attitude of Expectant Mother	*Number*	*Per cent*
Favorable	184	55.0
Unfavorable	88	26.5
Indifferent	59	18.5
	331	100.0

This test of attitude toward rooming-in of all expectant mothers in the Prenatal Clinic was undertaken merely as a poll of opinion because of the increase in the number of spontaneous requests for rooming-in both from clinic and private patients. However, mothers continue to be selected on the original basis of (1) wanting to nurse; (2) wanting rooming-in; and (3) relative normality. Parity, age, race, economic or social status have not, *per se*, been determinants in selection; in these respects selection has been representative. The weighting of the selection in terms of the expectant mother's wish to nurse her baby has probably brought to rooming-in a relatively high proportion of well educated parents. In this connection it is a noteworthy fact that married nurses and wives of graduate students, of medical students, and of medical staff, have been eager applicants for rooming-in and enthusiastic participants.

The first indications of satisfaction on the part of both mothers and nurses to rooming-in experience appeared promptly. The first group of student nurses assigned to the Rooming-in Unit made a special point of expressing their viewpoint in the following way at the end of their two week assignment:

"We know the mothers like rooming-in. We thought you would like to know the nurses like it, too, and when we have babies this is the way we would like to have them." The spokesman of this group married a few weeks later. She documented the sincerity of her response by applying for rooming-in shortly after she knew she was pregnant.

Some might comment that the first mothers to be cared for in the Rooming-in Unit would of course be pleased and satisfied; they wanted to come, in the first place, and the care and the attention would be particularly attentive under the stimulus of the newness of the venture. However, the enthusiastic response of the mothers has continued month after month. After all, for each successive group of mothers and each successive group of student nurses in the Unit there is the same stimulus of a new and vital experience. During the first 3 months most of the mothers wrote comments in notebooks that were provided for the record of their care of the baby. These comments were all on the appreciative side. We had every reason to believe in their sincerity, since very often practical suggestions were added. For instance, one of the first primiparous mothers called our attention to the fact that it might be better to assume that the baby should spend the first couple of nights in the little nursery at the end of the Unit, and not put the burden of decision on the mother. No mother, she said, would want anybody to think she did not want her baby, even though at the moment she wanted undisturbed

quiet most of all. Other mothers made other suggestions. It was evident that they enjoyed participation in an undertaking that was trying to make the mutual adjustment of mother and new-born a happy experience, for themselves and for their successors.

The same reasons for liking rooming-in appeared over and over again in the comments from different mothers, whether primipara or multipara. They liked to watch the baby, his facial expression, his smiles, his movements. They liked to hear his baby sounds. They did not worry what was happening to him as all multiparous mothers said they did when their former babies were in the ward nursery. They felt secure in having the same nurse take care of the baby who was taking care of them. They liked being able to ask either nurse or doctor questions as soon as questions arose. They learned much in the care of the baby by watching the nurse during the first few days, and gained assurance in taking care of the baby themselves under supervision during the last few days of the hospital period. For the most part, they liked the *ad lib* schedule, because they could observe the easy contentment of the baby. They greatly enjoyed the father's visits, and his participation in holding and learning to care for the baby.

The following appreciative comment on rooming-in, recently received from a mother with her first baby, is typical.

> What do I think of Rooming-in? I think it is wonderful. There are a great many observations I could make—all of them complimentary. However, in that case this would become a thesis rather than merely a "list of comments," so I shall simply mention the two most important factors in my impression of this experiment.
>
> My baby girl, Diane Margaret, and I will be going home tomorrow, and I know that if I had not been given the privilege of being in Rooming-in, I would be a nervous wreck tonight. I have often heard the adage that a new mother invariably cries the night before she goes home from the hospital. Well, I can easily see why. Even though she has read literature on baby care and perhaps attended Mothers' Classes, still she has had no experience in caring for a real live baby. Here in Rooming-in, we new mothers learn first by watching the nurses care for our babies, and then we augment that knowledge with actual experience. Also, we are given answers to all the many important and perhaps some trivial questions that come into our minds as we watch that wonderful little son or daughter.
>
> Our course in Mothers' Classes gave us a great many helpful hints on breast feeding, but in Rooming-in, through the untiring efforts of the nurses and doctors in charge, a mother's desire to nurse her baby finds fulfillment. This is the most important reason why I hope there will be many Rooming-in Units in the new hospital. There are many girls today who sincerely want to breast feed their babies, but they are never given the right start in the hospital, and they find themselves going home with a bottle-fed baby. This situation is a disgrace.
>
> Another great advantage of Rooming-in is that the previously neglected father, who could only see his baby through a glass window, now is given his rightful privilege. He now can watch his baby, hold her, learn to care for her. Consequently, when mother and baby come home, he does not feel afraid or self-conscious, and can be a real help and comfort.

The multiparous mothers, without exception, expressed preference for the rooming-in experience over their previous hospital experience, and stated that they got as much if not more rest in rooming-in as they had had previously; in any event, they said, they felt stronger and more rested at the end of their hospital stay and much more ready to undertake the care of the baby at home. Furthermore, they expressed appreciation for the companionship with other mothers which the Unit afforded. They learned much by observing the other mothers with their babies and exchanging experiences. They became used to the idea that each baby was quite different from every other baby, and that each baby differed in reactions from day to day. They felt they were going home with a baby they really knew, and not with a perfect stranger. Many commented after they had gone

home that the transition from the hospital to home was easy.

This observation of the mothers has been supported by observations of the visiting nurses making the usual post-hospital home visits. They have noticed that the rooming-in mothers are more ready to dispense with their services than mothers who have not become acquainted with their babies or learned how to take care of them in the hospital.

It must be emphasized that all women, even though they think they want rooming-in, do not adapt equally happily to it. Mothers who are not at peace with themselves will unwittingly provoke difficulties in whatever situation they may be. For instance, some highly intellectual women may elect rooming-in because they believe on intellectual grounds that nursing is the correct procedure. In actuality some of these find the *ad lib* schedule insupportable. They are bothered by the conflict between the baby's demands and their own interests and pre-occupations. A few sensitive mothers who are light sleepers and who demand long hours of sleep have been bothered by the unscheduled activities of the Unit. It must, however, in all fairness be repeatedly stated that the hyper-sensitive mother would present problems under almost any type of hospital care. The few mothers in rooming-in who have had difficulties with the *ad lib* schedule or with sleeping have, none-the-less, favored the rooming-in arrangement, and have even recommended it to friends or relatives. The rooming-in staff is, of course, more likely to hear the favorable comments. On a few occasions adverse comments have been repeated to them which, when traced to their source, were found to originate from people who had no direct participation in the rooming-in plan.

We have observed an occasional mother who is over-determined to nurse the baby, as a kind of defense against her own mother's open opposition to breast feeding and the "modern, silly business" of self-demand schedules. Such a woman's exaggerated dependence on success in breast feeding and her unwillingness to accept the doctor's recommendation for weaning is, of course, not salutary for the child. But, again, this type of family problem would present difficulties for the mother in handling her baby whether she was in rooming-in or not.

In summary, we may therefore say that the general reactions of mothers to rooming-in have been very favorable. The few outstanding problems that have arisen can be understood in terms of the personality reactions of the mothers. Rooming-in is clearly indicated for the normal healthy mother who wants it as an aid in giving the baby a good start. It may in time prove to be a constructive help to the more inadequate and insecure mothers. It should not be imposed on mothers who do not want it. The favorable response of the mothers, especially of the primipara, is in large measure dependent on the constant availability of interested nursing care under joint pediatric and obstetric supervision.

REACTIONS OF NURSES

The Rooming-in Unit was planned to have constant nursing coverage for the 4 babies and 4 mothers. This has been arranged through rotation of student nurses in groups of 3 for round-the-clock service for 2 week periods. The time of the nurses has been fully occupied in the care of 4 mothers and 4 babies; there has not been as much difference between day and night activities as expected. The nurses have felt pressed and unable to give everyone satisfactory care when a fifth mother-infant couple outside of the Unit has been added to their responsibilities. There has been a graduate nurse in charge of the Unit whose employment was made possible by a grant-in-aid.* This means that

* Mead Johnson and Company.

each nurse is able to take care of several mothers and babies throughout the lying-in period and conversely that the mothers have the same set of nurses caring for them throughout their hospital stay. This has been a satisfactory and instructive arrangement for both mothers and nurses. In the first 10 months of operation of the Unit there have been approximately 60 student nurses who have had this experience. Each student has written an evaluation of her obstetrical experience contrasting the experience in the Rooming-in Unit with that on the usual obstetrical ward and nursery service. The obstetrical supervisor[8] has stated:

> Without exception every single student who has been assigned to the Rooming-in Unit has been most enthusiastic about her experience there. Their comments were all in favor of the arrangement. The students say over and over again that this is the first time in their nursing education experience that they have been able to give what they consider ideal care to a patient. I am convinced that this bit of experience, although at the present only 2 weeks in length, is of unexcelled value to the student. She is able to observe every single thing that happens to the mother and the baby and the mother and baby together. She has an opportunity to teach the parents about their new baby. She has an opportunity to explain to them or to answer for them many of the questions that come up in this new relationship. . . . I believe that the nurse giving this care will herself be better prepared both as nurse and as potential mother.
>
> One student writes in contrasting her maternity ward and new-born nursery experience with her rooming-in-experience: "It was a sort of race with time that left no individuality for anyone. There wasn't time to wait and see if the baby had taken the breast nor was there time to stop and encourage the mother with the poor nurser, but rather some impatience with the mother who wanted to finish combing her hair or fixing her face at 6:00 a.m. rather than taking the baby. Rooming-in was a great change from the aforementioned. Although we were kept busy, we were not rushed, and there was plenty to do. Having the mother with the baby seemed to make the mother more considerate of the nurse's time. She didn't ask for things to be done when she could see that the nurse was busy with another mother and baby."
>
> Another writes: "There is a relaxed, peaceful attitude about the Unit which runs without the everlasting clock-control that is found in larger units and especially in the nursery. I did not like working in the nursery or on the ward. In the nursery I felt as though I were running a machine which had to produce freshly diapered babies with a heated formula every 4 hours, and I did not like it on the ward because I felt intensely rushed with beds, baths, meals, and routine postpartum care."

The Visiting Nurse Association of New Haven is represented on the Rooming-in Committee. A cordial working relationship is maintained between the Rooming-in staff pediatricians and the visiting nurses who visit in the homes of rooming-in families through exchange of telephonic reports. As previously indicated, some of the visiting nurses have reported finding rooming-in mothers more independent than other mothers just home from the hospital and more quick to dispense with their practical help. Some of the visiting nurses have found, on the other hand, more time being claimed by rooming-in mothers who want to talk out with the nurse a somewhat complicated family or economic problem in relation to the baby's welfare. Reports on the babies have been generally favorable.

CONCLUSIONS

Procedures in the Rooming-in Unit have met with generally favorable response from both mothers and nurses (and also from staff physicians, fathers, and infants). It has proved to be a helpful educational experience for everyone involved. Multiparous mothers prefer it to the usual hospital procedure because of the help it offers them in getting a good start with the baby, and they therefore recommend it for mothers of first babies. It is too early to evaluate any long range effects. Rooming-in is not applicable to all mothers, and

should not be imposed on any mother who is hesitant or unwilling. Student nurses have, in general, preferred rooming-in to any other hospital training experience. The constant nursing coverage by student nurses favorably oriented to rooming-in procedures and under consistent nursing and medical supervision has been a large factor in the maternal satisfaction.

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AMERICAN PUBLIC HEALTH ASSOCIATION

1790 Broadway New York 19, N. Y.

Can Public Health Agencies Handle Poliomyelitis Alone?*

HART E. VAN RIPER, M.D.

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THE marked decrease in poliomyelitis incidence in 1947 has again convincingly demonstrated the total unpredictability of this disease. The nation has been fortunate in experiencing a period of respite after four consecutive years of widespread epidemics. In the four year period from 1943 through 1946 the cumulative polio total reached an all-time peak of more than 70,000 cases. This year, however, fewer than 7,500 cases have been reported in the United States as of September 27, 1947. There is no positive explanation of this decrease in incidence, nor can we find in an analysis of present public health figures any hint as to what may be expected in 1948. Perhaps last year's near record high of more than 25,000 cases established immunity in a great section of the population, but there is no definite proof to substantiate the belief. Despite the intensity of all our efforts, despite the diligence with which we have sought to unravel the mysteries of this crippling disease, it is still impossible for any man to predict accurately the area or the intensity of next year's epidemics. As in the past, we can only hope for the best while preparing for the worst.

Such uncertainty in respect to poliomyelitis presents a problem in public health. Just how does our defense against a disease of such erratic nature fit into the public health picture? Is it practical for a community to maintain facilities in constant readiness to cope with an epidemic that may never strike? Is it practical to depend entirely upon public health agencies to rise to the occasion when the crisis comes? What *IS* the most logical plan of polio preparation for the average community?

We must learn to face the fact that there is no adequate preparedness short of *total* preparedness. Bearing always in mind the expense involved in polio treatment, the necessity for special technical equipment, and the real shortage of qualified personnel, we arrive quickly at the conclusion that the problems arising out of polio epidemics lie far beyond solution on a local basis. If an area is to fight a major epidemic aggressively and intelligently, it must have the best possible facilities available on short notice.

Our official health agencies are set up to handle local health problems to the best of their ability. They carry on their operations with limited personnel, working under a limited budget, based on what may be expected of them in the normal course of events. With few exceptions they do an adequate job in connection with hygiene, sanitation, sewage disposal, pure water supplies, milk and food sanitation, and control of most communicable diseases. In many cases they are doing an outstanding job. In no case, however, can a public health agency, alone, cope with a major

* Presented before the Health Officers Section of the American Public Health Association at the Seventy-fifth Annual Meeting in Atlantic City, N. J., October 8, 1947.

polio epidemic when it strikes with full force at the heart of a community. For the full impact of an epidemic constitutes a major catastrophe within the stricken area, and an official agency can no more prepare for such an emergency than it can prepare for hurricane, earthquake or flood.

When polio strikes and your public health agency requests assistance, The National Foundation for Infantile Paralysis stands by with the resources of an entire nation at the disposal of the public health officer.

A community that has never experienced an epidemic of infantile paralysis cannot appreciate the resources, local, state, and national, that may contribute to the solution of its emergency situation. The National Foundation has been in the thick of the fight against polio for the past 10 years. The knowledge gained from intensive work in the field in every major epidemic the nation has experienced in the past decade is available to every community.

A polio epidemic calls for the broadest kind of action, based on preparation for such an eventuality in any part of the country. There is no time for governmental red tape, no time for trial and error, no time to train and instruct key personnel. There is time only for a quick shifting of equipment and trained personnel to the epidemic area. Our defense against this disease must be a fluid defense.

Any deficiencies become evident at the very outset of an epidemic. Faced with the necessity of providing adequate resources on short notice, local defenses soon break down under their understandable but, nevertheless, very real limitations. Only the combined efforts of both official and voluntary agencies working hand in hand, and with the financial support of the entire American nation, can be considered a maximum attempt to meet the emergency needs when polio strikes.

There are those who have severely criticised voluntary health agencies in general, and The National Foundation for Infantile Paralysis in particular, for alleged opposition to official health organizations. On the contrary, it is a matter of public record that wherever the National Foundation has contributed its services to the local picture —and the occasions are as numerous as the sporadic flare-ups of polio throughout the nation—it has worked with, and under, the direction of regularly constituted state, federal, and local health departments. Every one of its 2,735 county chapters is prepared to coöperate in every way with public health authorities in providing funds, in recruiting doctors, nurses, and physical therapists, in supplying trained Polio Emergency Volunteers and in securing every type of equipment from respirators and hot pack machines to hospital bedding and wool packs.

Its services know no barriers of state lines as it attempts to fulfil its pledge that no victim of infantile paralysis shall go without the best available care and treatment. Whereas polio is just a small segment of the function of the public health agency, the National Foundation is devoting full time to the conquest of this particular disease. Its services to public agencies do not terminate when the fury of the epidemic has been reduced to normalcy. Rather, with the lessons learned from years of firsthand study, the National Foundation has set about to aid official organizations in the correction of inadequacies that have become evident under the pressure of emergency.

Probably the most serious flaw in the public health program has been the scarcity of qualified workers to carry out the exacting tasks for which these agencies are responsible. Programs of public health demand interested and competent workers, experts in their field who are prepared to put into practice

new methods, new techniques and new standards. Personnel of this type can be obtained only by making special training available to qualified candidates, by financing postgraduate study in public health and by offering scholarships to promising students who are eager to make public health work a career.

The need for capable physicians and nurses, for sanitary engineers, bacteriologists, epidemiologists, statisticians, public health educators, and technicians is a need which has seriously limited the operation of official agencies. Through a series of direct grants to the U. S. Public Health Service and professional organizations, the National Foundation is financing the development of personnel to fill these essential positions. Fully realizing that the conquest of poliomyelitis hinges upon the intensity of the fight against all diseases, we are today strengthening the position of officially constituted organizations by contributing thousands of dollars to the training of public health workers. Let me tell you some of the things that are being done in this respect.

Early in 1946 there existed 1,200 vacancies for physicians and engineers in state and local health departments throughout the country. In a move to encourage widespread interest in public health on the part of physicians and engineers returning from military service, the U. S. Public Health Service applied to the National Foundation for funds to be used in the public health training of personnel recruited to fill these positions. The application was approved in July of last year and a grant of $228,400 made to provide fellowships for qualified candidates. Up to September 30 of this year 35 awards have been made to sanitary engineers and 18 to public health physicians. Additional applications are under consideration. We feel that the presence in health departments of well trained health officers and sanitary engineers assures us of maximum efficiency in our efforts to control poliomyelitis. And our support of official agencies does not stop here.

Health education through the facilities of the U. S. Public Health Service has long been hindered by the lack of trained personnel. The well trained health educator, working as a permanent member on the staff of the local health unit, has proved to be of invaluable aid in establishing an overall health program by coördinating the resources of both official and public health agencies within the community. The importance of the rôle played by the health educator has been increasingly recognized by local health officers, many of whom have budgeted funds for the employment of such personnel. But again we face the handicap of an acute shortage of qualified individuals who have a knowledge of both public health and education. To alleviate this situation The National Foundation for Infantile Paralysis has made, since 1944, direct grants to the U. S. Public Health Service totalling $160,000 to be used for fellowships in public health education. With this support, a total of 58 awards have been made, and many more are needed to meet requirements of expanding health education activities.

The personnel shortage has also been felt severely in public health agencies with regard to orthopedic programs. Supervisory nurses with qualifications in both physical therapy and public health nursing have been most difficult to obtain. The preparation of individuals to fill supervisory posts entails great expense for the agency and for the nurse. In addition, the paucity of teachers of orthopedic nursing has severely limited the development of workers in this field. Only by offering real encouragement to nurses to qualify as directors and instructors of orthopedic nursing courses can we meet the demands of the future.

The National Foundation for Infan-

tile Paralysis is particularly interested in this phase of public health work, for it relies heavily upon the skill of experienced orthopedic nurses to minimize the crippling aftereffects of poliomyelitis and to prevent deformities in its victims. Therefore, since 1940 we have approved a series of grants to the National Organization for Public Health Nursing totalling $125,950 to train and instruct capable supervisors and directors in orthopedic public health nursing. Up to the present time, 48 scholarships have been awarded, and the National Foundation will continue to support and finance this project which is contributing substantially to the general effectiveness of official health agencies.

Unfortunately, the personnel problem cannot possibly be handled by public health organizations within the limitations of their budgets. The recruiting of qualified individuals is not accomplished in haphazard fashion. For the past 2 years we have underwritten to the extent of $25,350 the American Public Health Association's field consultation service to state and local health departments in connection with recruitment and selection of personnel and the maintenance of sound personnel procedures.

The same organization was further aided by a 2 year grant of $10,000 to acquaint city, county, and state health authorities with the importance of the sanitary engineer in maintaining a healthy environment.

It becomes quite evident then that, rather than working in opposition to public health agencies, the National Foundation has maintained a policy of direct assistance in the building of sound, vigorous official organizations, capable of leading the fight against disease within their communities. But it still rests heavily upon voluntary agencies—specialists in their field—to carry on the bulk of the work in combating a specific disease. Every advance that the National Foundation makes against poliomyelitis is an accomplishment in control of all diseases. Every research project carried on with the financial support of the National Foundation is a major effort in the quest for national health. Whether we represent voluntary, private or official health agencies, our goal is the same.

By working hand in hand, by cooperating willingly and energetically, we may look forward to new accomplishments in the service of the American people—and of all humanity.

Coördination of Hospitals and Health Departments

Joint Statement of Recommendations by the American Hospital Association and the American Public Health Association *

THE American Hospital Association and the American Public Health Association have prepared this statement to define the areas in which fuller cooperation and integration of hospitals and health departments may be achieved. The statement is confined to an exploration of these areas and does not concern itself with other aspects of either hospital management or community health organization. It is hoped that hospitals and health departments will find it a useful guide to their attainment of closer working relations in the interests of greater efficiency and improved health service.

Among the foremost institutions which today serve the health of the community is the general hospital. Not only has the hospital developed during the past few decades into the basic institution providing the technical facilities for adequate health appraisal and modern diagnosis and treatment of disease, but it has also become an indispensable workshop for the practising physician. Through its ability to make essential technical procedures available to physicians and other personnel the hospital exercises a strong and direct influence on the quantity and quality of medical and health services.

Because of its important position the general hospital's responsibilities in the total community health picture have been constantly expanding. In addition to the provision of facilities for medical care of high quality, its functions now include training of medical and allied personnel, medical research, and participation in local public health activities.

Profound changes and advances in the activities of health departments have paralleled this expansion in hospital functions. The achievement and maintenance of ever higher levels of community sanitation is making it possible for health departments to turn increased attention to developing programs to improve individual health through immunization, education, and health supervision; at the same time they have found it essential to provide therapeutic services if communicable diseases such as tuberculosis and syphilis are to be effectively prevented. Health departments have begun to recognize the important public health implications of such major health problems as cancer, heart disease, and other long-term illnesses and to combat them by providing certain facilities to aid in early diagnosis and treatment. In order to secure maximum effectiveness for these campaigns they have begun to develop increasingly closer relationships with hospitals and practising physicians.

Preventive and curative medicine have reached the stage where they are no longer separable, and it is necessary at the present time to bring them together physically and functionally. The close physical and organizational association of health departments and hospitals will

* This report has been approved by the Executive Board of the American Public Health Association on the recommendation of the Committee on Administrative Practice and the Subcommittee on Medical Care. It has been adopted as an official statement of the two associations.

provide a valuable step toward this essential goal.

Hospitals and health departments have a common interest in providing the best possible technical facilities and administrative tools for the further development of both the preventive and therapeutic aspects of medical practice. The expression of this relationship in terms of greater coördination of the activities of hospitals and health departments has already occurred in some communities, but a great deal still remains to be accomplished in this direction.

HOUSING OF HOSPITALS AND HEALTH DEPARTMENTS

Since a considerable increase in the construction of hospitals and public health facilities may be expected in the next few years, it is appropriate that certain advantages of joint housing be pointed out at this time. It is strongly recommended that, wherever circumstances justify and permit, there should be joint housing of hospitals and health departments, and, if possible, the offices of physicians and dentists.

Although coördination of the activities of hospitals and health departments can be accomplished even if they are not closely integrated physically, it is most feasible when there is joint housing of the hospital and health department. The common use of laboratory and clinic facilities, which is difficult to achieve when the two institutions are physically separated, occurs readily when they are housed together. The planning of integrated programs is facilitated by joint housing and their administration is made smoother and more efficient.

Outpost rural areas

The health needs of rural areas which are isolated, thinly settled, and unable to support a general hospital may be met by the construction of outpost health facilities. These facilities would house the offices of physicians and dentists, diagnostic facilities, the office of the local public health nurse, public health clinics, and in some areas a nursing unit for maternity care and minor illnesses.

The physicians whose offices are located in the outpost facility should be members of the medical staff of the nearest general hospital. Arrangements should be made for transportation of patients from the outpost area to the hospital and for consultation visits by the hospital staff to the outpost facility. Otherwise the outpost personnel may deteriorate professionally owing to their medical isolation or the outpost facility may attempt to undertake functions belonging properly in the general hospital.

Populous rural areas

The establishment of hospitals and public health facilities in many rural areas will require entirely new construction. It is recommended that in these areas hospital and health department facilities be constructed as an integral whole. It is particularly recommended that physicians' offices be included in the new structures so that the time and effort usually expended by private practitioners in shuttling back and forth between office and hospital would be minimized. This arrangement would facilitate laboratory and x-ray examinations of the physicians' patients, prevent unnecessary duplication of expensive technical equipment and make it easier for physicians to consult with their colleagues.*

Many advantages to the public, the health department, and the hospital

* The joint housing of hospitals and health departments has already been effected in a number of areas such as Sonoma, Monterey, and Kern Counties, California, and Washington, Charles, and Wicomico Counties, Maryland. In addition, plans to build combined hospital and public health facilities are under consideration in several counties in California; six districts in Manitoba, Canada; Etowah County, Alabama; Winston-Salem, North Carolina; Schoharie County, New York; El Dorado City, Kansas; and Eaton, Barry, Ionia, Allegany, and Van Buren counties, Michigan.

may be derived from joint housing of hospitals and health departments. A single health and medical center means greater convenience and continuity of service for the public. The pooling of resources resulting from joint housing enables the community to obtain more adequate facilities and better trained personnel than it could otherwise afford.

Through joint housing the hospital achieves greater prestige as the community center for all health and medical activities; it is able to hire a more competent staff by virtue of its increased financial strength and can therefore offer more comprehensive and effective service. Joint housing facilitates follow-up by public health nurses of patients after they leave the hospital, while the medical staff benefits from closer association with public health programs. Furthermore it may stimulate increased public interest in the hospital since more people will visit the institution for health promotion and preventive services rather than as a last resort.

The health officer likewise benefits professionally from more intimate association with physicians engaged in clinical medicine. His health programs receive added impetus from the increased knowledge and interest in public health gained by practising physicians, interns, and nurses. Case finding for public health programs in the hospital wards and outpatient department is facilitated. The health department attains new stature, dignity, and public understanding.

Where the general hospital already exists and health department facilities are needed, it is recommended that the latter be constructed as an addition to the hospital or adjacent to it, and that an understanding be reached between the two agencies concerning joint use of certain facilities in order to avoid unnecessary duplication. This plan, however, may not be practicable in some instances because of the isolated location of the hospital.

While it is administratively easier to combine the rural hospital with health department facilities when both are public institutions, there is little reason why joint housing of voluntary hospitals and public health facilities cannot be achieved.*

Urban Areas

In small cities with one existing general hospital it is recommended that health department facilities be constructed as part of or adjacent to the hospital wherever feasible. It may be more difficult to arrange for joint housing in cities with more than one hospital. Nevertheless, the difficulties are not insurmountable.†

In larger cities public health facilities should, in so far as it is logical and possible, be built as part of or adjacent to general hospitals. Of course this will not be feasible in neighborhoods which do not have hospitals. Where joint housing can be achieved it will have an important effect in improving the coordination and effectiveness of hospital and health department activities.

The cities in which medical schools are located present a special situation. In such cases the principal public health facility should be built on the grounds of the teaching hospital.‡

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* In several counties of Maryland, for example, the health department pays rent for that portion of the hospital which it occupies, and the arrangement has proved highly satisfactory.

† In the city of Niagara Falls, New York, which has two voluntary general hospitals, plans are now being considered to construct the principal public health facility adjacent to one of the hospitals and to locate smaller centers at strategic places throughout the city. These plans were formulated with the help of the local medical society and both voluntary hospitals, and received their full approval.

‡ This is the plan followed in Louisville, Ky., where the medical school, teaching hospital, and public health department form a single, integrated medical center. In New York City, five of the municipal public health centers are adjacent to medical schools. The health officers hold faculty positions in the medical schools, and medical students serve clinical clerkships in the public health centers. There is no doubt that considerable advantages accrue to both parties from this arrangement.

PERSONNEL AND ADMINISTRATION

There are many ways in which health department and hospital personnel can work together effectively. In urban areas, for example, coöperative arrangements between hospital social workers and public health nurses can prevent duplication of services and increase efficiency. In rural hospitals and health departments, although medical social workers are not generally employed by the separate institutions, it should be possible to employ a medical social worker to serve both agencies where there is combined housing of the health department and hospital.

In urban as well as rural areas the public health nurse can provide continuity of care for discharged hospital patients by carrying out the treatments recommended by the physician and giving home nursing care and supervision. This is true not only for patients with communicable diseases but for all hospital patients, whether ambulatory or not, who require further home supervision or care. Physicians, hospitals, and health departments should together agree on and carry out simple and effective referral systems.

In many areas the shortage of public health nurses limits the possibilities of this type of service. Nevertheless in some rural communities the public health nurse is able to perform a substantial amount of bedside nursing care. In the cities there has been a significant trend toward the amalgamation of voluntary visiting nurse services with those furnished under the health department program, thereby improving service and increasing the potentialities of physician-hospital-health department coöperation in this field.

There are several ways in which the medical staff of the hospital can contribute to the activities of the health department. Arrangements may be made for members of the visiting staff to conduct specific health department clinics on a part-time salary basis. Members of the visiting and resident staffs can instruct public health nurses in current medical advances and assist in the health department's educational program by lecturing to community groups. Such service by physicians contributes to the building of a close partnership of physician, hospital, and health department to meet the overall health needs of the locality.

Consideration should be given to broadening the concept of intern or resident training to include a definite period of time spent in a public health department approved for this purpose. This would improve the physician's understanding of the preventive approach to medicine and acquaint him with services available to the public through the health department and other community agencies.

The achievement of closer administrative relationships between hospitals and health departments does not come about automatically but requires careful and continued planning as well as administrative finesse. Where the health department and the hospital are jointly housed but under separate administration, joint conferences should be instituted and definite fields of administrative coöperation outlined to further closer and more harmonious relationships.

In those areas which have a small community hospital and health department the appointment of a single administrator for both organizations may be considered.* There is need for further experimentation in this field.

Closer coördination of the training of health officers and hospital administrators is needed to familiarize health offi-

* In Branch County, Michigan, for example, the health officer is also director of the voluntary general hospital. This arrangement has made it possible to offer sufficient compensation to attract a competent physician. It has also proved highly advantageous in achieving greater coördination of hospital and health department activities and a better quality of administration.

cers with hospital problems in view of their increasing responsibilities for hospital planning, construction, inspection, and licensure, and to develop hospital administrators and health officers who have sufficient understanding of each other's activities to coördinate them effectively. This would also make available personnel competent to direct combined hospital-health department units. Several schools of public health have already recognized the importance of such coördination by requiring one basic course of training for both groups and permitting specialization subsequently in either public health or hospital administration.

PREVENTION OF COMMUNICABLE DISEASE

The control of tuberculosis, venereal disease and other communicable diseases affords numerous opportunities for joint action by hospitals and health departments. Tuberculosis and venereal disease clinics belong properly at the general hospital, not at the city hall or some other non-medical institution. Likewise rapid treatment centers for syphilis should, in so far as possible, be housed in general hospitals rather than organized separately.

With present knowledge of the control of cross-infection there is very little reason for establishing special hospitals for the care of acute communicable disease. With the possible exception of large urban centers such special hospitals are economically wasteful and seldom provide services which meet the total medical needs of the patient. A more rational approach is to use general hospital beds for the care of patients with communicable disease and to obtain the assistance of the health department in developing effective isolation techniques. Such coöperative action will be facilitated if the hospital appoints the health officer to its medical staff as consultant in communicable diseases.

Routine chest x-rays as well as serological tests for syphilis ought to be undertaken by all hospitals. The interest of the health department in these health protection activities should take the form of substantial financial and technical aid. With such assistance every hospital can become a strategic center in the community attack on tuberculosis and venereal disease.

Close working relationships between general hospitals and tuberculosis sanatoria are necessary to afford sanatoria patients the advantages of modern surgical therapy as well as consultation services. For similar reasons a portion of the newly established hospital beds for tuberculosis should be located in or closely connected with general hospitals.

Laboratory service is essential to communicable disease control as well as to the proper functioning of hospitals. Health departments and hospitals have a vital interest therefore in the planning and development of adequate laboratory service.*

In some states hospital as well as health department laboratories are approved by the state department of health which, in addition, holds an annual educational meeting of laboratory directors and supplies them with current bibliographies on technical subjects. Marked improvement in laboratory standards has resulted from such procedures and they have been well received by hospital laboratory personnel.

PROGRAMS FOR NON-COMMUNICABLE DISEASE

With the progressive conquest of many communicable diseases attention has shifted to other major causes of

* In some of the rural counties of Maryland, the use of a joint laboratory has been found to be advantageous, since the additional financial resources allow the utilization of better trained personnel. In small cities with more than one hospital as, for example, Jamestown, N. Y., it has been found effective to have a single director administer the health department laboratory as well as the several hospital laboratories. This arrangement provides a well integrated laboratory service and enables the community to obtain a director of high caliber.

disability and death. Heart disease, cancer, and mental illness are rapidly becoming recognized as having significant public health implications. The epidemiological study of such diseases —their prevalence and relation to socio-economic, environmental, and constitutional factors—can shed much light upon their origin, prevention, mitigation, and treatment. The social effects of non-communicable diseases, their chronic nature in many instances, their increasing importance as the population ages and the huge expense involved in their care put them beyond the scope of the individual physician or hospital alone and mark them clearly as among the most important public health problems of the day. Accordingly, there have been renewed attempts to construct adequate systems of morbidity reporting and greater emphasis has been placed on health education as a preventive device in the management of non-communicable disease.

Hospitals provide an effective environment in which to educate the public in health matters.* In addition hospitals are repositories of much valuable information on the incidence of disease which should be studied and utilized in the development of control programs. They occupy an important position in relation to plans for controlling heart disease and cancer and are natural locations for cardiac and tumor diagnostic clinics. The recent development of cancer detection clinics, in which apparently well persons receive thorough diagnostic examinations, promises to encourage greater concentration on this type of preventive activity by the staffs of general hospitals.

It has long been recognized that psychiatry suffers through its isolation from general medicine. Similarly the average physician, having received little or no training in psychiatry, is handicapped in his ability to recognize, treat or prevent mental disease. The importance of mental illness is indicated by a recent estimate that approximately 1 patient out of every 28 new admissions to general hospitals, and 1 out of every 16 new admissions to outpatient departments presents problems requiring the services of the psychiatrist.

Owing to the passage of the National Mental Health Act a large-scale development of research facilities and clinics for mental hygiene may be expected. In many areas the local and state health departments will be responsible for administering the mental health program and integrating it with other health activities. It will be to the best interests of psychiatry and medicine in general if hospitals welcome the establishment of mental hygiene clinics and incorporate their functions as part of a general hospital service. Large general hospitals should establish psychiatric services for observation and treatment of mentally ill patients and, wherever feasible, the medical staffs of general and mental hospitals should develop liaison in order to provide consultation services to patients of mental institutions and to furnish the patients of general hospitals with skilled psychiatric assistance. In this way a more fully generalized and comprehensive service to the community would be achieved.

MATERNAL AND CHILD HEALTH

Maternal and child health clinics should be easily accessible to the persons served and many must be conducted in communities or neighborhoods which do not have hospitals. Nevertheless, there are numerous instances where the general hospital is easily accessible but is not utilized for such services. This situation, which has arisen from the separate development of hospital and health department facilities, prevents both hos-

* This has been demonstrated by the excellent programs of The Johns Hopkins Hospital in Baltimore and the Shoemaker Clinic in Cincinnati.

pital and health department from operating at their maximum effectiveness in the protection of maternal and child health. Health department prenatal clinics for the adjacent neighborhood should be conducted in the general hospital in order to insure continuity of care, easy transfer of records, and adequate postpartum follow-up. Similar considerations apply to well child and pediatric diagnostic and treatment clinics. The maternal and child health clinics conducted by health departments in areas not easily accessible to hospitals should be affiliated with the central hospital clinics for referral of complicated cases.

Still other opportunities exist for closer relationships between hospitals and health departments. The latter can supply educational literature to hospitals for distribution by physicians to their maternity patients. The state department of health in particular can furnish consultation services by medical, nursing, nutrition, and other staff members. Hospitals can enlist the aid of the health department to prevent outbreaks of infant diarrhea and to develop comprehensive programs and facilities for the specialized care of premature infants, and should coöperate with the health department and practising physicians in their review of maternal and infant deaths. The health department can assist hospital laboratories to make determinations of the Rh factor by furnishing consultation services, providing typing sera, or actually performing the tests.

All too often the public health nurse receives notice of the birth of a child several weeks after its occurrence and the mother is thereby deprived of her advice and assistance during the period when they are most important. This problem has been solved in some areas through coöperative arrangements by which the health department is informed of the birth before the mother and child leave the hospital. In many communities arrangements have been made with physicians and hospitals for the public health nurse to see the mother while she is still in the hospital as well as make a preparatory visit to the home, thereby establishing the best possible conditions for adequate home follow-up.

The proportion of home deliveries is still too high in many areas. Hospitals should give serious attention to the provision of sufficient maternity beds to meet the needs of the entire community, particularly for the care of complicated cases.

MEDICAL CARE AND HOSPITAL SERVICES

A number of specialized medical care programs, including those for communicable disease, tuberculosis, venereal disease, and crippled children, are recognized responsibilities of health departments, and it is desirable that they be entrusted with new programs of community medical care which may be assumed by various levels of government. It would seem wise therefore for hospital and health authorities to undertake intensive research on several mutual problems. One of these, for example, is the creation of a satisfactory cost accounting system which will be equitable to both the hospital and the health department.

The experience of the last few years, particularly with the Emergency Maternity and Infant Care program, has established the important principle that the hospital receive full cost for the care of patients for which government assumes full responsibility. This precedent should be followed in all public medical care programs provided that an agreed standard of care is established and there is proper cost accounting.

In approximately three-quarters of the states the state health departments have been given the responsibility for hospital surveys and planning incident to the Federal Hospital Survey and Construction Act of 1946, and it is expected that they will be given similar

administrative responsibilities with respect to the construction phase of the program. This will inevitably encourage much closer relationships between hospitals and health departments than have ever existed in the past.

Hospital licensure laws have already been enacted in most states and with few exceptions the state department of health has been designated as the responsible agency. Much of the activity of the agencies administering such laws is of an educational character, designed to assist hospitals in improving standards of service to the public.

A significant expansion in the number of full-time local health departments as well as in the scope of their activities may be expected in the next few years. Similarly the nation's hospital system will be extended to many areas which now lack adequate facilities and greater emphasis will be placed on the community responsibilities of the general hospital. It is important at this time that hospital and health department administrators plan to achieve maximum coordination through joint housing, coöperative use of personnel, and the development of active programs to safeguard and promote the health of their communities.

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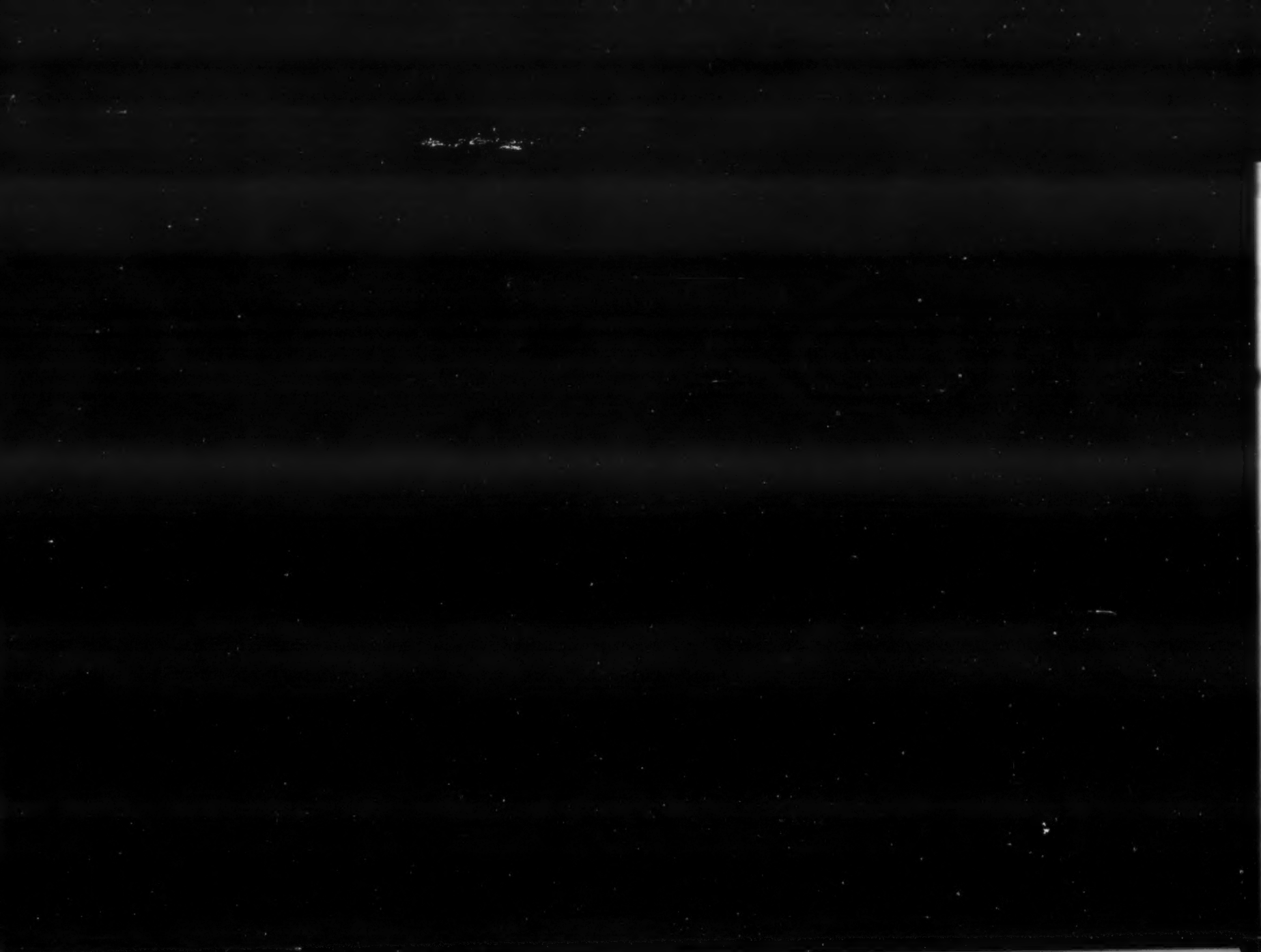

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PROGRESS IN THE STUDY OF ORGANIC INSECTICIDES

TWO years ago, Dr. F. C. Bishopp[1] reviewed for us the status of DDT as a public health insecticide; and progress in this field has been so rapid that we have asked Dr. J. M. Andrews of the U. S. Public Health Service Center at Atlanta to bring the subject up-to-date, in the Special Review Article of this issue of the *Journal*. The importance of such a review is indicated by the fact that Dr. Andrews cites 134 articles bearing on the subject, most of them appearing within the past two years.

The use of DDT has been brilliantly justified by recent experience, particularly in dealing with malaria, with murine typhus, and with various diseases carried by sandflies. It has been useful in the control of the house-fly, but with certain distinct limitations, which the sanitarian should bear in mind. DDT is not effective against the larvae of house-flies and blow-flies, and certain strains of house-flies appear to develop special resistance against this insecticide in the adult state, a phenomenon analagous to the evolution of drug-resistant strains of various pathogenic microbes. It is clear that fundamental sanitary measures for the control of fly breeding cannot be neglected.

Dr. Andrews reviews suggestive studies of various solvents used with DDT and of new alternative insecticides such as Chlordane and DDD. He notes the importance of guarding against toxic effects, although "DDT when used as an insecticide, with reasonable intelligence and the precautions normal to the use of modern insecticides, is harmless to man and animals." He emphasizes the need for regulating dosage, when insecticides are applied on a large scale over wide unoccupied areas to destroy insects harmful to health, forest trees, or agricultural crops, so as to avoid upsetting the general balance of wild life.

All in all, we believe that this review will be of unusual value to our readers. The use of the new insecticides marks one of the major advances in the history of public health; and it inaugurates a far-reaching change in sanitary practice through the replacement of rule-of-thumb (or rule-of-nose?) nuisance control by scientific sanitation.

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THOMAS PARRAN

THE United States Public Health Service has a history of a century and a half behind it (although for the first part of that period it was called the Marine Hospital Service and performed only the function of providing medical and hospital care for sailors of the Merchant Marine). Hugh S. Cumming, Surgeon General from 1920 to 1936, transformed the organization from a sound but somewhat pedestrian service to a vital and progressive one; and many of the outstanding leaders of the U. S. Public Health Service were brought forward to positions of influence under his regime. "Tom Parran," who succeeded him has presided with wise vision and courageous initiative over the most distinguished era in the history of the Service.

The following brief chronological list of the major new ventures undertaken during the twelve years of General Parran's service (which ended this spring), is an impressive record:

1937. Initiation of a National Research Program on the cause and cure of cancer.

1938. Initiation of a National Program for the control of venereal diseases (in which Dr. Parran's personal leadership was particularly influential in breaking down old prejudices and which has made most fundamental contributions to the administrative application of modern rapid-treatment methods).

1943. Organization of the United States Cadet Nurse Corps, which was of great value in meeting war needs.

1943. Radical reorganization of the structure of the Service, to secure greater efficiency in operation.

1944. Initiation of a National Tuberculosis Control program.

1946. Initiation of a National Mental Health Program, probably the most effective step ever taken in this or any other country, to translate talk into action in this most important and most neglected field of public health.

1947. Actual initiation of a nation-wide survey and construction program to develop essential hospital and health services for neglected areas.

Meanwhile, the outstanding program of research, at the National Institute of Health, has been continued and expanded, so that this Institute represents the most fruitful research agency in the field of public health anywhere in the world. Grants-in-aid to states, local health services, and institutions for expansion of public health work and research have averaged 13 million dollars a year in recent years, while for the same period expenditures by states have increased from 16 to 52 million dollars a year.

Dr. Parran had been released from 1930 to 1936 to serve as Commissioner of Health of the State of New York, where he built up—on the foundation laid by Hermann M. Biggs—one of the most outstanding state health departments in the country. In recent years he has made notable contributions in the field of international health, and presided at the New York conference where the Constitution of the World Health Organization was drafted in 1946. It is as the "S.G." however, that he is most widely known to us. It was primarily for his leadership of the U. S. Public Health Service that he received 16 honorary degrees, and the Sedgwick Medal and the Lasker Award from our Association. With no prejudice to his predecessors who served in less health-minded years, Thomas Parran stands today as the most outstanding Surgeon General of the world's most outstanding national health service. He is a young man of whom we shall hear more in the future.

THE BATTLE OF BRITAIN

THE new British National Health Insurance Act will come into force on July 5, replacing the present National Health Insurance program which on that date goes out of existence. At the present writing, the British Medical Association plans to refuse participation, supported by a two million dollar Fighting Fund (described by the lay press as a "Strike Fund"). Feeling on both sides is bitter. The *British Medical Journal* raises the cry of governmental dictatorship, and frankly appeals to "emotion as the driving force behind reason and action." The *New Statesman* says that the British Medical Association is "seeking to debase" the generous motives which animate the healing art "by arousing emotions which, when they are sincere, are mistaken, and, when they are less than sincere, are a betrayal of the doctor's calling and of the loyalty and affection of his patients."

The conflict is a tragic one; and it is important for us, in the United States, to understand what the shooting is about. Many Americans have been led to believe that it concerns the basic principles of compulsory health insurance; but this is not the case. England has had compulsory health insurance for more than thirty-five years. "All concerned, doctors as well as public, recognize the need for a National Health Service; all accept broadly the structure of the Act in regard to the whole hospital system; all realize that there must be a public medical service based wholly or mainly on capitation fees. This is as it should be; fundamentally this is a good Act; its provisions are better than most previous proposals and it gives to doctors themselves a far larger representation than they did have—on Executive Councils, Appeal Tribunals, Medical Practices Committees, and the rest—in the administration of the Act."[1] The negotiating committee of the medical profession itself pointed out that "such differences as have arisen between the government and the main body of the profession relate not to the objective itself (the establishment of a comprehensive medical service), but to the means proposed to achieve the objective."

The issues which divide the medical profession from the government are four in number:

The first of these, and the one which perhaps bulks largest in discussion, is the provision of the Act which establishes a basic salary of 300 pounds for every physician, to which will be added capitation fees based on the number of families served. It is estimated that a moderate practice should yield a total income of 2,000 pounds. The basic salary is included in the Act to make sure that the young physician just starting in practice shall have at least a minimum income while he is building up his panel practice. The British Medical Association resents this as an "entering wedge" for the principle of salaried service and proposes a higher capitation scale as an alternative.

A second bone of contention is the provision in the Act that practices built up on a panel basis in the future cannot be sold by a retiring physician to a potential successor. (The government has arranged to recompense all physicians for the cash value of practices existing prior to July.)

A third point of conflict is the provision in the Act that if a physician wishes to move to a new area, he cannot take a panel practice in that area without the permission of the committee representing the panel doctors in that area. Private practice for the well-to-do, as well as consulting service by specialists, will be, of

course, entirely free; and the decision whether local panel practice is sufficient to warrant an additional panel practitioner is made, not by any government official, but by the local panel practitioners themselves. A fund of 400,000 pounds is provided for inducements to physicians to serve in "under-doctored" areas.

Fourth, the British Medical Association objects to the fact that the decision of a local executive committee (50 per cent medical) to remove a physician's name from the panel list can be appealed only to a special tribunal composed of a lawyer appointed by the Lord Chancellor, a medical practitioner appointed after consultation with the medical organizations and a third, with exerience in local executive committees. A decision of this tribunal unfavorable to the physician concerned may be vetoed by the Minister of Health, but not a decision favorable to him. The British Medical Association demands further appeal to the lay courts.

There have been certain minor points at issue; but these are the four major factors which threaten to produce a "Doctor's Strike" in Britain next July.

No one in this country can fully evaluate the issues involved; but such journals as the *London Spectator* give us a picture of the trend of public opinion in quarters sympathetic with the medical profession. Such opinion is reasonably unanimous in supporting the Minister of Health on points 3 and 4 above (avoidance of excessive competition for panel patients in an "over-doctored" area and prohibition of the sale of public panel practices). The opposition of the British Medical Association to these two provisions seems to have little public support. On the fourth point, right of appeal from the Minister of Health to the Courts on the part of the practitioner removed from a panel, public opinion seems generally to back the new Act; it would seem, however, that a concession on this point to the British Medical Association would not do anyone serious harm.

The first issue listed above, the basic 300 pound salary, would also appear to be properly open for conference and possible reconsideration. The purpose of this provision is an excellent one. Such a salary was included in the report of the Medical Planning Commission, representing the British Medical Association and other medical bodies, in 1942. Yet the present opposition to this basic salary is so strong that its elimination or modification might well be considered.

The *London Spectator* said—before the result of the doctors' plebiscite was known—"It is of cardinal importance that the Act shall come into force on the appointed date, now less than five months distant, and that it shall be worked not by men driven into a corner against their will, but by a body of practitioners determined under conditions which satisfy them to do their best for the health of the nation, as every doctor is doing today. Difficult as the situation is, there is no reason why this should not happen, for sharp though certain outstanding differences may be, none of them is incapable of adjustment. There can be no ultimatum to the doctors; nor can there be one by the doctors. When the result of the plebiscite is known some kind of contact between the Minister and British Medical Association must be reëstablished. And the public, for whom this Act was devised and who need it urgently—particularly that large middle class, uncovered by National Health Insurance, on which a long illness or a serious operation falls with such crushing financial weight—must insist that outstanding questions be thrashed out between reasonable men in a spirit of common sense."

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THE JOURNAL INDEX

THE last issue of this *Journal* was devoted to books; but to the scientist in any field periodical literature is equally important, and often more difficult to find when you want it. How often have you wondered where you saw that typhoid epidemic described or where that excellent article on health education appeared?

You will find the answers, so far as our *Journal* is concerned in a complete Index of its first 35 volumes (1911–1945). The preparation of this Index by Louise Pickens Tanner and Fred Wilbur Tanner has been a labor of love for which the Association owes these authors a deep debt of gratitude. It covers original communications, editorials, committee reports, and Association news, cross-indexed by subject and author; and occupies 335 pages of text. Here, you can find reference to what Biggs said about tuberculosis in France in 1918, to what Chapin wrote about air and contact infection in 1912, and to Sedgwick's Presidential address in 1913. This volume will be invaluable for our members and for students of public health in every country.[1]

REFERENCE

1. The volume may be obtained from The Garrard Press, 119 West Park Avenue, Champaign, Ill., at a price of $7.00.

Clearing House on Public Health Salary Information

Salaries in State Health Departments

IN February the State and Territorial Health Officers Association released the study of salaries of state public health workers prepared at its request by the U. S. Public Health Service.

The study represents actual salaries paid * state health officers, 9 selected program directors, and 6 occupational groups of public health workers in the employ of state health departments in November, 1947 — medical, nursing, sanitary engineering, sanitation, nutrition, and professional laboratory personnel. The study does not represent a detailed job analysis of positions. It is therefore based on comparable titles which do not always represent comparable levels of responsibility. In spite of its lack of statistical refinements, this study serves a useful purpose in focusing attention on salaries.

Nor does the study indicate desirable salary levels. For practically all titles studied the salaries range widely among the 48 states. The highest salaries paid by a few states may not be within reach of all states, but it is certain that in most instances median salaries or less will not produce substantial responses from applicants.

The data of the study are shown entirely in the form of charts. These are of three kinds: bar charts showing in descending order the amount paid state health officers and bureau directors in 9 categories; bar charts showing salary ranges for 8 groups of workers in relation to number of persons in each salary class; and tables showing number of workers in the eight groupings in various salary classifications in each state, the states grouped in the U. S. Public Health Service Districts.

State health officer annual salaries range from $5,000 to $15,000, but in only 7 states were they as high as $10,000. These states are in New England, the Middle Atlantic, South Eastern, and Pacific Coast regions. The median was $7,500 which is also the mode and was paid by 10 states. In 17 states the health officer's salary was less than $7,000, and in 6 states less than $6,000. For directors of local health services salaries ranged from $4,500 to $9,600.

Of the directors of medical specialties, the director of tuberculosis control activities appears to be slightly in the lead. The range of salaries and the number in certain salary groupings are shown in Table 1 for three groups of medical specialties.

No medical personnel other than state health officers received more than $9,000 except in one state. One such worker in each of 3 states in 3 different regions was paid less than $3,600. A total of 133 workers, one-sixth of the number in this category, received less than $5,000. These salaries were scattered among all regions except the Pacific Coast states.

State directors of sanitary engineering, of whom 47 were reported, were paid salaries ranging from $4,250 to $11,000. The median, paid in 3 states, was $6,000. Nine state sanitary engineers

* Except in some instances in which position was vacant and minimum rate shown in the State Compensation Plan was used.

TABLE 1

	Maternal and Child Health Service	*Venereal Disease Control*	*Tuberculosis Control*
Number of States Reporting	47	39	38
Highest Salary	$7,750	$9,200	$11,700
Lowest Salary	4,200	4,200	4,500
Median Salary	6,250	6,000	6,300
Number Receiving			
$7,500 and over	2	3	6
Less than $6,000	18	15	11
Less than $5,000	7	6	4

received $7,000 or more; 12 received less than $5,000.

The median salary of the 446 sanitary engineers below the rank of directors was between $4,000 and $4,200; 44 per cent of the entire number received less than $4,000 and one-seventh received $5,000 or over. Seven persons in this category received $7,000 or over. Nearly half of the salaries ranged between $3,600 and $4,400.

For this group of workers the median was the same in all areas except the Pacific Coast states where it was $4,200–$4,400 and the Mountain states with $4,000. These two areas are less significant because of the small numbers involved.

Sanitation personnel is treated as a separate category throughout the study. In the effort to get a reasonably homogenous group, veterinarians, entomologists, rodent, bedding, and drug and narcotic inspectors were omitted. Even this group of 1,388 workers represents a wide range of salaries and presumably also of qualifications.

Salaries of this group range from $1,440 to $9,200 with both the median and the mode between $2,400 and $2,600. Fewer than 1 per cent received more than $5,000; and one-fourth less than $2,400. Median salaries for this group vary rather widely for the different regions of the country. Only in the Eastern and Southern states, which employed two-thirds of the reported workers in this category, is the median as low as the national median.

In the Mountain, West North Central, and South West states the median is $2,600–$2,800; in the East North Central, $3,000–$3,200; and in the Pacific Coast states $3,200–$3,400.

This material also shows an interesting relationship between sanitarians and sanitary engineers. For all of the states a ratio of one engineer to three sanitarians is indicated by the figures. The range however is from practically an equal number of engineers and sanitarians in the East North Central states to more than six sanitarians per engineer in the 12 Southern states.

The ratios are shown in Table 2 by the U. S. Public Health Service districts:

TABLE 2

U. S. Public Health Service District	*Engineers*	*Sanitarians*	*Ratio of Sanitarians To Engineers*
Total	446	1,388	3
1	124	278	2+
2,4	102	649	6+
3	92	117	1+
5	20	56	3–
7,9	100	245	2+
8	8	43	5+

Laboratory personnel is divided into directors and one other group limited to professional workers. Forty-five states reported directors of laboratory services with salaries ranging from $3,600 to $10,000. The median was $6,000. Twelve states paid less than $5,000, and only 6, $7,000 or more.

Nearly one thousand of the workers other than directors were reported with salaries ranging from less than $1,400 to more than $7,400. The median was between $2,800 and $3,000 and the

TABLE 3

Salary Range	*Supervisory and Consultant*	*Staff Level*	*Graduate Registered*
Total Reported	534	1,530	647
Median	$3,100–$3,200	$2,300–$2,400	$2,000–$2,100
Highest	$5,500–$5,600	$3,500–$3,600	$3,200–$3,300
Lowest	Under $2,400	Under $1,800	Under $1,600
Number Receiving			
More than $3,000	363	64	2
Less than $2,400	3	842	597

mode, affecting 142 persons, between $2,400 and $2,600. Only 6 per cent received $5,000 or more and nearly one-fourth less than $2,400. As to regional medians, the median for Eastern and for North and South West Central states was equal to that of the country as a whole, that for the 12 Southern states lower, and for other areas higher.

Public health nursing personnel was divided into four categories—directors of public health nursing, supervisory and consultant nurses, staff level nurses, and graduate registered nurses. The three latter groups were found in the ratio of one, three, and one and one-fifth.

All but 2 of the 48 states reported salaries for directors of public health nursing. These salaries ranged from $3,200 to $7,375 with $4,200 as the median. In 7 states only was the salary $5,000 or over; in 8 states it was $3,600 or less.

The median salary for the supervisory and consultant group was between $3,100 and $3,200. For the 534 reported positions salaries range from less than $2,400 to $5,600. However only 5 persons received $4,800 or over, and only 33 received $4,000 or more, while about one-third received less than $3,000.

The ranges of salaries for the three groups of nurses in the field of public health other than directors are shown in Table 3.

State directors of dental health services were reported for 44 states. The highest salary paid was $7,100 in one state, a state in which the director of maternal and child health, of venereal disease control, of tuberculosis control, and of sanitary engineering were paid respectively $7,680, $7,080, $8,280, and $8,280. The median salary for dental health directors was $5,400. Fourteen salaries were below $5,000 and 8 were above $6,000.

State directors of vital statistics were reported for 47 states. The salary range for this group of workers was from $2,400 to $8,000 while the median was $4,500. In only 3 states was this position paid at $6,000 or more and in 15, less than $4,000.

Nutritionists. Salary reports were received for approximately 100 nutritionists on the staffs of state health departments. For these the median salary was $3,000–$3,100, affecting 14 persons. Only 6 persons received more than $4,000 and 18 received less than $2,700. Nearly half of the total number received between $2,700 and $3,200. Because of the small numbers involved this group was not classified either by state or by region.

It is now expected that similar studies will be made annually. It is hoped that the experience of this first study can be used to refine job definitions and classifications so that comparisons will be meaningful in terms of training and responsibility.

Credit Lines

FURTHER LIGHT ON THE PECKHAM HEALTH CENTER

The Pioneer Health Center in London (otherwise known as the Peckham Health Center) has been discussed in connection with the centennial meetings of the Community Service Society of New York which brought Dr. Innes H. Pearse and Dr. G. Scott Williamson to New York in March. The following notes supplement the information that is available in the volume *The Peckham Experiment—A Study in the Living Structure of Society*, by Innes H. Pearse, M.D., and Lucy H. Crocker, B.Sc., published by Yale University Press, 1945, 333 pp., price, $3.50. (See *A.J.P.H.*, 34, 10:1103 (Oct.), 1944.

A conversation between the executives of national health agencies and Dr. Pearse brought out the following interesting factors:

Throughout the development of this plan the interest has been focused on insusceptibility rather than on susceptibility to disease. The center of interest is health rather than disease. The family is the unit, for all the thinking and planning and experience has shown that the earlier recognition of various derangements, both physical and psychological, gives a great advantage in prompt action and correction.

Dr. Pearse believes that the causation of disease lies as much in the environment as in the individual.

Being reluctant to invade the homes for case work, the group set up a recreational club to bring the people out on their own volition and to provide a center where the medical services could be carried out. Two thousand families have been included in this service, made up of about 8,000 individuals. A so-called "overhaul" examination was carried on 5 days a week from 2 to 10 p.m. Throughout this examination that which was right in the individual's health was sought rather than that which was wrong. In about 10 per cent of the persons nothing wrong appeared but this 10 per cent that was physically and mentally normal was not necessarily made up entirely of mature and well adjusted individuals.

Of the entire group, about 20 per cent came in with some disease or complaint and experience showed that at least half of these conditions were unknown to the medical profession. In this particular group money was not the primary reason for keeping people away from medical care.

One of the most prominent developments was the improvement shown by women in the capacity to carry on during pregnancy so far as family responsibilities were concerned.

The service made a point, since the family was a unit, not to forget the father of the family, who is usually away at work during the ordinary clinic hours.

A very clever means of admitting only those who were members and whose dues were paid was devised in individual keys for the door which automatically registered the attendance of the individual and would admit him only if his dues were paid. This method was also used in the study inside the center in studies of what is called the "Action Pattern."

A motion picture describing the Pioneer Health Center under the title of "The Center" is available in the United States from the Offices of the British Information Service, 30 Rockefeller Plaza, New York City.

ETCETERA

If you do not see the *Statistical*

Bulletin of the Metropolitan Life Insurance Company regularly, you should. Just as an example, the November, 1947, issue discussed "The Tuberculosis Problem—Retrospect and Prospect," the theme of which is "The time is ripe for an all out war to stamp out tuberculosis in our country," and significantly, "Side by side with these specific measures is the general effort to provide better housing and better living and working conditions generally for the people of our country."

Other articles in this issue are "The Chances of Being Born Alive," which we are told are determined by a variety of factors, among them "order of birth"; another estimates that the cost of the common cold is over a billion dollars a year and thus "must be rated high in the list of enemies of the public health."

The same issue reports a sharp increase in motorcycle accident fatalities, and on the other hand a decline in mortality from toxic goiter.

SOUTHWESTERN MINNESOTA HEALTH DAY

"Health Day" may come to be a technique for organizing communities to meet their health problems. At any rate, a group of six counties comprising the Southwestern corner of Minnesota along with the Southwestern Minnesota Medical Society and its Women's Auxiliary and the Minnesota Department of Health State District Health Unit in that area tried this technique late in February. Representatives of the Minnesota School of Public Health, farm and labor groups, public schools, nursing and welfare agencies, and representatives of the state health department all met in Worthington to discuss "Our Community Health Problems," "Farm and Home Safety," and "Mental Health in Child Development." The six counties participating in this "Health Day" have a total population of about 100,000 and make up one of the State District Health Units. This experiment in coöperation might be a first step in setting up a local district health unit. Further information can be secured from The Division of Public Health Education, Minnesota Department of Health, Minneapolis 14.

DOCTORS CONSIDER THEIR SOCIAL RESPONSIBILITY

"The Plight of the Negro Physician in American Medicine" was the subject of a recent public discussion held at the New York Academy of Medicine under the sponsorship of the Physicians Forum. Speakers were:

Montague Cobb, M.D., Professor of Anatomy at Howard University
Alfred E. Cohn, M.D., Rockefeller Institute for Medical Research
Curtis Flory, M.D., Chairman, New York County Chapter of the Physicians Forum's Committee on Civil Rights in Medicine

It is heartening to see physicians take some responsibility for understanding—and perhaps doing something about—the disadvantaged members of their profession.

"THE ANNUAL," WESTERN BRANCH A.P.H.A.

There has recently come from the press, under the auspices of the Western Branch American Public Health Association, a first issue of *The Annual*, representing a résumé of papers presented at the first post-war meeting of the Western Branch held in San Francisco in May, 1947. This excellent publication was made possible through the contributions of several pharmaceutical houses to the Western Branch.

The five chapters include papers on Preparation for Public Health, on Mental Health and Geriatrics in a Public Health Program, on Public Health Administration, on Housing and Community Planning, and on Communicable Diseases. Included are the

Presidential Address of Karl F. Meyer, M.D., and the address of Thomas Parran, M.D., Surgeon General, U. S. Public Health Service, on Expanding Responsibilities and Opportunities in Public Health. Other contributors are Drs. Charles E. Smith, Harold D. Chope, Edward S. Rogers, Robert H. Felix, Kent A. Zimmerman, Lester Breslow, Alfred M. Popma, Howard West, Florence R. Sabin, Malcolm Merrill, Arthur Ringle, L. J. Lull, J. S. Cull, Raymond V. Stone, Richard K. C. Lee, James H. Steele, W. R. Giedt, G. L. Dunnahoo, and William McD. Hammon. The field of health education was covered by Dorothy B. Nyswander, Ph.D., that of graduate training in the West for nurses by Miss Mary J. Dunn, that of engineering training by Professor Harold B. Gotaas, and housing by Charles L. Senn and Allan A. Twichell.

The officers of the Western Branch are to be congratulated on having produced so commendable a volume in spite of the difficulties. The Publication Committee was under the Chairmanship of Richard A. Koch, M.D., San Francisco.

"CRADLE TO THE GRAVE" SOCIAL SERVICES OUTLINED

If, as has been said, a country may be judged by the way it cares for its children and its aged folk, there is plenty of evidence now available for judgment to be passed on modern Britain.

The evidence has just been summarized in a pamphlet *Social Services in Britain*, produced by the British Information Services, 30 Rockefeller Plaza, New York 20. This summary not only includes welfare schemes for the very young and the very old in Britain, but also the new security measures covering the sick, the unemployed, expectant and nursing mothers, widows, parentless children, the industrial injured, and even the decent disposal of the dead. In other words it demonstrates Britain's claim to care for its citizens "from the cradle to the grave."

PREVENTIVE MENTAL HYGIENE IN WELL BABY CLINICS

Beginning in October, 1947, the Baltimore City Health Department in its Eastern Health District began a program designed to make preventive mental health a part of the general public health services offered in the well baby and maternity clinics. Before the program was started seminars were held for physicians and nurses to outline preventive mental hygiene possibilities in their maternal and child health work.

This program, together with an "Outline of Mental Hygiene in Maternal and Preschool Child Health for Public Health Nurses" is described in *Baltimore Health News* (25:1–2 (Jan.-Feb.), 1948), which is available from the Baltimore City Health Department, Municipal Building, Baltimore.

DISINFECTING WATER MAINS

"A Procedure for Disinfecting Water Mains," appearing in the February issue of the *Journal of the American Water Works Association,* is a report approved by the A.W.W.A. Board of Directors on September 30, 1947. It suggests both preventive and treatment procedures to minimize the possibility of contamination of a water system. The laying of new systems and repairing of existing ones are also covered.

ENGLISHMAN SUGGESTS A HYGIENIC FORK

The author of *A Hygienic Fork*, I. Gordon, M.D., Edin., Deputy Medical Officer of Health, Ilford, Essex, England, calls attention to the fact that very little change has been made in the design of tableware as a means toward better eating utensil sanitation. He suggests a three pronged dinner fork having tines half the length of those in the con-

ventional fork, with the edges and bases of the prongs bevelled for greater ease in cleaning. This article appears in the August 9, 1947, issue of *The Lancet*, a weekly British medical journal.

BERNARD BARUCH ON MEDICAL CARE

The Committee for the Nation's Health has made available reprints of Bernard M. Baruch's address on *Medical Care for the People of America*. This was recently delivered at a dinner sponsored jointly by the Medical Society of the State of New York, The Coordinating Council of the Five County Medical Societies of Greater New York, and the Greater New York Hospital Association. In this he says "I would not be frank—nor friendly—if I did not add what you know. Voluntary health insurance is not enough." Available from Committee for the Nation's Health, 1790 Broadway, New York 19.

A SURVEY OF OPERATING DATA FOR WATER WORKS IN 1945

The February, 1948, issue of the *Journal of the American Water Works Association* reports on a survey of basic financial statistics of water works systems in the United States. This survey is based on a report of a committee authorized by the Board of Directors of the A.W.W.A. These data were compiled from questionnaires sent to the executives of properties in the United States serving communities of 10,000 or more. Of these, 462 were returned, representing aproximately 50 per cent returns. Data for each community on population served, source of water supply, controlling agency, volume of water provided, expenses, and income are included.

PUBLIC HEALTH IN BRAZIL

Several articles on tropical medicine and sanitation in Brazil are contained in the July, 1947, volume of the *Journal of the Servico Especial de Saude Publica*. Included are data on the incidence and mass treatment of intestinal parasitism in the valleys of the Amazon and Rio Doce Rivers, experiences with DDT and pyrethrum in the control of *Anopheles darlingi*, and a report on the construction of municipal water supplies in the area of the Rio Doce. Also included are a number of keys to the identification of Brazilian anophelines.

The Servico Especial de Saude Publica was created by an agreement between Brazil and the United States, represented respectively by the Ministry of Education and Health and the Institute of Inter-American Affairs. Operations have been continuous since 1942 with particular emphasis on public health practices in the more remote regions of Brazil.

100 YEARS OF PIONEERING

The Community Service Society of New York completes its first century in 1948. By way of celebration it is holding a series of symposia on "The Family in Tomorrow's World." Symposium II on March 17 and 18 concerned itself with "Health and Family Life." Among the speakers were Martha M. Eliot, M.D., President of the American Public Health Association, Professor C.-E. A. Winslow, Editor of the *Journal*, Hugh Leavell, M.D., of the Harvard School of Public Health, W. R. Aykroyd, M.D., of the United Nations Food and Agriculture Organization, and Bailey B. Burritt, Executive Director of the National Health Council, who for 30 years was General Director of the Community Service Society.

The memorial volume published in connection with the centenary celebration is a handsome book entitled *Frontiers in Human Welfare*. It is a thrilling story of the movements this agency, one of the oldest in New York City, pioneered. They are large in number and varied in interest—tenement house reform, milk inspection, visiting nurse

service, social service education, case work standards, nutrition service, old age care, fresh air camps, and a multitude of others.

For information about the published proceedings of the symposia and about *Frontiers* write Community Service Society, 105 E. 22nd St., New York.

WILL DALLAS LEAD THE WAY?

The following editorial appeared in the *Dallas Morning News* for February 23. Is this a harbinger of local government organization in which consolidated health units will lead the way? Whether a flash in the pan or the beginning of a trend, it deserves the consideration of every public official—health and otherwise.

One-fourth of the nation's population is without adequate health service, Dr. Haven Emerson, member of the American Public Health Association, says. He blames lack of funds. There aren't enough funds for all the departments, but the big trouble is too many departments.

The forty-eight states have some 18,000 local health units. That figures out an average of about six departments per county. Dr. Emerson, recognizing the inefficiency in this multiplicity, says 1,200 departments can do the job, or an average of about one health department for every three counties.

Drop Dr. Emerson's criticism right in the middle of Dallas County, and it is apt. We have twice as many health departments as we need. To go further, we have twice as many tax offices and policing agencies as we need. To go further, Texas has twice as many counties as it needs.

Until there is a sensible merger of these services, they are never going to be what they ought to be. As long as we have a county tax office that is king bee in its own sphere and a city tax office in its sphere, the tax payer is going to suffer in his sphere.

Unified control, uniform regulations and enforcement, permanence of policy, and tenure for employees would give Dallas County a public health service that would be the envy of the state.

The day will come, of course, when not only city and county services are consolidated, but the consolidation of services of several contiguous counties will be effectuated. A boundary will be meaningless when urban centers run into other urban centers. In the meantime, merging Dallas's two health departments is a sensible step toward the efficiency the tax payer deserves.

PIERRE THE PELICAN SERIES

The Louisiana Society for Mental Health, Hibernia Building, New Orleans 12, has produced a series of pamphlets which is being distributed to the mothers of new-born babies, one pamphlet a month for twelve months. These pamphlets are designed especially for the parents of first-born children and are unique because of the simplicity and highly focused interest.

According to Lloyd W. Rowland, Ph.D., the Director of the Society, the reading level is the sixth grade and several unique educational devices have been included. The series has been prepared for "a highly motivated group" and the conversations have been put into a little character invented for the purpose—Pierre the Pelican. He carries the discussion through and gives continuity to the pamphlets and succeeds rather well in keeping the discussion from becoming long-haired. Quiz forms have been cleverly used at the end of each pamphlet.

The series is already being used in West Virginia and certainly the idea will have appeal elsewhere. Among those who have been consulted with reference to the series are Dr. C. Anderson Aldrich, Professor of Pediatrics of the Mayo Foundation; Dr. Milton J. E. Senn, Associate Professor of Pediatrics in Psychiatry at Cornell University Medical College, and Dr. Robert L. Sutherland, Director of the Hogg Foundation for Mental Hygiene at the University of Texas. Specialists from Ohio State University have been used to adjust the language to the proper level. It is gratifying to see an unusual piece of work so well done. It is worth the attention of other state departments of health and of mental hygiene.

FOOD HANDLERS' SCHOOLS

Food Handlers' Schools in Hawaii describes the preparation and actual presentation of a course of instruction for food handlers. Suggestions are given on such subjects as selecting the time of day for classes, location of the school, size of class, extent of records, and literature to be distributed. Discussed also are publicity, program content and methods of presentation, illustrations of charts used, and photographs of laboratory preparations demonstrated as part of the course. This report, prepared by B. J. McMorrow and F. A. Schramm, appears as *Supplement No. 199* to Public Health Reports of the U. S. Public Health Service.

PTA FOLLOWS THROUGH

The April *National Congress Bulletin* of the National Congress of Parents and Teachers, in an open letter to its local presidents from its national president, Mrs. L. W. Hughes, brings its members up to date on the Local Health Services Bill (S. 2189, H.R. 5644, H.R. 5678) sponsored by PTA. Mrs. Hughes summarizes the action of her agency's February Health Conference and suggests how each local chapter may stimulate community health planning. The same issue carries a digest of the Local Health Services bill by PTA's legislative chairman, Mrs. Stanley G. Cook.

ANNUAL REPORTS

Twenty-five Years of Public Health in New Mexico, the report of the first quarter century of the New Mexico's State Health Department, has just been published for the period 1919–1944.

It will be remembered that New Mexico is the only state with a mandatory health district law grouping the state's 31 counties into 10 health districts whose health departments are operated by local boards of health with the coöperation and assistance of the State Health Department. The events that led up to this mandatory law passed in 1935 can be traced in this 25 year report. In 1921, for example, 5 counties had full-time county health officers, in 1922 three more were added, in 1924 two more. But in 1926 two fell by the wayside and in 1927 another. The doldrums of the early 30's gave rise in 1932 to the first recommendation to district the state for health purposes.

In the meantime recurring frequently in the various biennium reports are such comments as "Our record in respect to diphtheria is not one of which we are proud" (1921–1922); "this biennium also witnessed typhoid outbreaks" (1923–1924); "occasional cases of malaria have appeared in two new areas of the state" (1925–1926); "the infant mortality rate is the highest in the United States" (1931–1932); "New Mexico has the highest infant death rate in the United States" (1937–1938).

A final chapter on the present health status of New Mexico points out that the infant death rate is still the highest among the 48 states; that the tuberculosis death rate is among the highest; the death rate from infectious and contagious diseases is three times that of the country as a whole. More than two-thirds of its dwellings have unsatisfactory sewer connections compared to 35 per cent in the entire country. This document should be the bible of things done and still to be done for citizen groups who want to start a movement for better health protective services.

Our hats off to the State Health Officer, James R. Scott, M.D., and his staff for telling the bad news as well as the good. Only in this way can come to pass the hope expressed "that the report on fifty years of public health may delineate the progress toward a more satisfactory status in the field of public health."

"Balance Sheet 1947" is the sub-title of the December, 1947, *Oakland's*

Health. This is the annual summary of the Oakland, Calif., City Department of Public Health. It has a Credit and a Debit section as well as A Job for the New Year—an interesting idea for a brief annual report.

The *1947 Annual Report of the National Social Welfare Assembly* is a brief summary of the activities and developments of the second year of this organization.

The *1947 Annual Report of the Social Security Administration* is the first report since its establishment in July, 1946, under the federal executive reorganization. It includes the report of the Bureau of Old Age and Survivor's Insurance, of Employment Security, and of the Children's Bureau. Along with the annual report of its companion agencies, the U. S. Public Health Service and the Office of Education, it is an analysis of the social welfare services of the federal government.

Has the Tide Turned? is the 34th annual report (for the year 1947) of the American Social Hygiene Association. It is a good brief and graphic description of the Association's current activities. The title suggests that in 1947 some of the ground lost during the postwar years 1945 and 1946, when the country experienced a spectacular rise in reported cases of syphilis and gonorrhea, was regained. The last year also saw the development of the extensive worldwide service in stimulating social hygiene activities.

BOOKS AND REPORTS

All reviews are prepared on invitation. Unsolicited reviews cannot be accepted. All books reviewed in these columns may be purchased through the Book Service.

Recent Advances in Public Health —*By J. L. Burn, M.D., D.Hy., D.P.H. London: J. & A. Churchill Ltd.*, 1947. 409 pp. Price, $5.00.

This book is a condensation of the enormous social advances of modern Britain in public health. It does not attempt to present a complete picture of public health progress. While including a broad coverage, even Municipal Foot Health Service and Welfare of the Aged, greatest emphasis is on maternal and child problems. There are detailed accounts of mental health services, the care of unmarried mothers, the handicapped child, including blind, color blind, squint, deaf, speech defects, tonsils, and asthmatic, the diabetic, the rheumatic, and the child with cerebral palsy. The author assumes a broad fundamental background and the book is for the professional public health worker. There are detailed accounts of diphtheria immunization procedures and of tuberculosis mass x-rays. The "social" permeation is seen even in venereal disease control, which emphasizes contact investigation and followup rather than penicillin treatment of syphilis. Reliance on health education, of persuasion rather than compulsion, will make every American health worker appreciate the similarity of our democratic processes.

The presentation includes many classic discoveries and thumb-nail descriptions, such as the famous M'Gonigle report on housing and health, showing that the higher rents of rehousing may deplete nutrition and increase death rates, the superb contributions of Pickles to rural epidemiology, and the unique Pioneer Health Center at Peckham. One tours the famous Papworth Village Settlement where the tuberculous work in a fashion which would make most American phthisiologists shudder and where, without benefit of BCG, the children of the tuberculous enjoy a remarkable healthy life without being removed from the tuberculous family. There is a summary of the remarkable experience at North and South Shields on the caries-deterring effect of optimal fluorine in the water.

The index is very poor, but this is a book to be read in its entirety. This is very easy, for illustrations are profuse and smart, and the phraseology and expressions are just enough different to be very lively. For instance in the section on "Defective Colour Vision," the author remarks on resultant social difficulties, such as "the man who wore a red tie by mistake at his mother-in-law's funeral." In the description of the Recuperation Centres for the care of exhausted mothers we read: "As one mother put it: 'I should never have had the pluck to have all my teeth out at home.'" Even the one gross error in fact arouses only an indulgent smile. In relating the American experience in smoke control, he discusses the experience of St. Louis, Minnesota—"St. Louis was the dirtiest city in Minnesota." Although most references are to British experiences, the "U. S. A." comes in for many, as do Canada, the Continent, Scandinavia, and the U.S.S.R. Each chapter begins with a pungent text and closes with excellent selected references and valuable further reading suggestions.

This is a book which every public health worker in the United States and Canada can read with real profit and genuine pleasure. Burn will personally guide you on a trip through Britain and will frequently surprise you with penetrating observations on your own practices. CHARLES EDWARD SMITH

Atlas of Bacteriology—*By R. Cranston Low, M.D., and T. C. Dodds. Baltimore: Williams & Wilkins,* 1947. 168 pp. 168 illus. Price, $8.50.

The purpose of this atlas is to afford students accurate pictures to refer to in illustration of lectures, practical classes, and textbooks.

The pictures are made from color photographs for the most part, giving the source of the material, how it is stained, what it shows, and the magnification. The characters of the microorganisms are not given.

The pictures substantiate the great trouble the authors have taken to insure accuracy and the coöperation and trouble taken by the original publishers (E & S Livingstone, Edinburgh) in meeting the exacting conditions required. This is undoubtedly the best atlas this reviewer has seen, and the selection of material is very good. It will be valuable to anyone who requires an atlas.

The value of the book would have been enhanced by the inclusion of references to the technique of the staining methods used. Minor criticism may be made of three items: the method illustrated on page 63 is Dorner's method and not Fleming's; the gonococcus colony on page 38 is misleading as it must be an old colony rather than a young one; the color of the pigment of "*B. pyocyaneus*" on page 21 is much too blue. E. G. D. MURRAY

The Cerebral Palsied Child and His Care in the Home—*By Viola E. Cardwell, R.N. New York: Association for the Aid of Crippled Children,* 1947. 196 pp. Price, $1.00.

This book is a welcome addition to the literature on cerebral palsy as there is still a paucity of written material on this subject. It is a carefully compiled book, written for the Association for the Aid of Crippled Children.

Although it was primarily intended to be used in staff education for nurses engaged in orthopedic public health nursing, it contains valuable information for physicians, technicians, and others who are beginning to become interested in this highly specialized field. In fact, the layman who has had to cope with the problem in his home will be able to comprehend most of the material and find helpful suggestions in the text.

The book is a practical one as the author has drawn from recognized authorities and workers in the field. Discussed in the first few chapters are the etiologic factors, pathology, prognosis for rehabilitation, and the various clinical forms of cerebral palsy which have been recognized to date. The remaining chapters deal with such important topics as mental hygiene, education, types of treatment, and the place of each in the overall program for the cerebral palsied child. The text also takes up the necessity of recreation and vocational guidance for those not too severely handicapped.

The author also pays tribute to the various societies founded by laymen, particularly those in and around New York City, which have demonstrated to physicians, educators, and technicians the need for programs of specialized care in dealing with this highly technical problem. These few interested parents have aroused long delayed interest in the cerebral palsied child and his many problems.

Replete with pictures and drawings of special equipment needed in the care of this type of handicapped child, it is

a valuable handbook which will help to further knowledge about this crippling disability. It is highly recommended to those who are interested in this field. HARRY B. SMITH

The Selected Writings of Benjamin Rush—*Edited by Dagobert D. Runes. New York: Philosophical Library,* 1947. 433 pp. Price, $5.00.

The idea of compiling an anthology of writings by Benjamin Rush is highly commendable. As a figure of unquestionable significance in the political, medical, and cultural history of the American colonies and of the early Republic, Rush deserves to be known by a wider audience than that of the historians and the autograph hunters. In this volume, Mr. Runes endeavors to meet this need. He has grouped his selections under four heads: Good Government, Education, Natural and Medical Sciences, and Miscellaneous Things.

As none of the writings of Rush have previously been readily accessible, this anthology renders a service deserving of commendation. Nevertheless, this commendation must immediately be followed by considerable qualification. Unfortunately, the book has been compiled with a complete lack of responsible editing. Such editing as the volume has received is perfunctory and highly inaccurate. There is a meager introduction of four and a half pages, which provides a few, somewhat garbled biographical data. There is a complete lack of orientation, as neither the major sections of the book nor the individual selections are provided with notes or introductions. To render the reader's confusion more complete the papers have not been printed in chronological order, the dates of the individual selections are provided only in the table of contents (some of these are wrong), and Rush's own titles have in several instances been replaced by new ones invented by the editor. Finally, the editor gives no indication of the sources from which he took his selections.

The longest section and the one that will probably be of greatest interest to readers in the public health field is that on medicine and science. While it is of little avail and indeed futile to quarrel with the selections of an anthologist, it is this reviewer's feeling that several excerpts from Rush's influential *Diseases of the Mind* might have been included. As it is, with all its inadequacies, this volume will perform a service by giving those who read it at least a partial view of the intellectual breadth and versatility of Benjamin Rush, physician, reformer, and revolutionary statesman.

GEORGE ROSEN

Construction and Analysis of Achievement Tests—*The Development of Written and Performance Tests of Achievement for Predicting Job Performance of Public Personnel—By Dorothy C. Adkins with the assistance of Ernest S. Primoff, Harold L. McAdoo, Claude F. Bridges, and Bertram Forer. Washington: Government Printing Office,* 1947. 292 pp. Price, $1.25.

During the past twenty years, a new applied science has been growing which has now achieved the dignity of a first textbook. To those who have been working in the field of achievement test construction, and particularly in the construction of tests used for the selection of public personnel, it has long been evident that enough special knowledge of this subject exists to justify its presentation in a systematic, formal way. It is especially gratifying that this presentation has been made by Dorothy Adkins.

An outstanding worker in this field, she was one of the group of examiners who did pioneer work in testing at the University of Chicago under L. L. Thurstone and who has since distinguished herself in her affiliation with the Social Security Board and the U. S.

Civil Service Commission. This active participation in the growth of achievement testing plus an admirable clarity of expression have resulted in an authoritative and readable book.

The use of written tests in the selection of public health personnel is, to an increasing extent, becoming accepted procedure. It should be a matter of real concern to public health workers who are involved in this process, either at the giving or the receiving end, to acquaint themselves with the fundamentals of a sound testing program. In four chapters are described, respectively, the planning of a written test, the construction and compilation of a test, the analysis of test results, and some special problems related to the development of performance tests. A fifth chapter, of greater interest to the technical reader than to the general reader, deals with basic statistical tools.

A wider familiarity on the part of public health administrators with the concepts presented in this book would go far toward increasing their understanding of testing procedures, so that they might more critically appraise the testing programs of their own departments.

The major value of the book, however, will be the impetus it will give to training psychologists in this specialized field. For those persons who are already working in the field it will serve as an invaluable manual and guide.

LILLIAN D. LONG

Developmental Diagnosis — *By Arnold Gessell, M.D., and Catherine S. Amatruda, M.D. (2nd ed.) New York: Harper*, 1947. 496 pp. Price, $7.50.

The keystone of child hygiene and clinical pediatrics is growth and development. The authors of this book are well known as leaders in studying methods of exact determination of stages of mental development in the young infant. Painstaking observation and accumulation of long series have permitted the authors to set standards and describe patterns of growth which meet scientific criteria. The present volume, a second edition six years after the first, describes in detail how these measurements may be made, and gives precise directions for those who would learn the technique. Line drawings illustrating performances expected in the more important tests are included. There is commendable emphasis on the shortcomings of a single examination and the need for repeated evaluation in order to establish a pattern of growth.

Beyond basic description the authors also diiscuss interpretation of findings and rightfully stress the need, on the part of everyone working with children, for understanding and appreciation of normal patterns and basis landmarks. A word of caution is in order here. Just as variability in physical growth sometimes defies exact measurement, so reservations and qualifications must surround classification of border-line deviations from the normal pattern of mental growth. Emotional factors are not as easily measured as muscular activity and coördination. Furthermore, determination of mental age or consistency of growth does not necessarily give an etiological diagnosis. For example, the evidence for a diagnosis of birth injury as opposed to cerebral maldevelopment does not appear adequate in many of the cases cited.

There is great need for wider availability of accurate psychometric examinations, even on a formal basis, and this book should continue to be a very useful tool in achieving that objective.

MYRON E. WEGMAN

The American Year Book, 1946 —*Edited by William M. Schuyler. New York: Thomas Nelson & Sons*, 1947. 1110 pp. Price, $12.00.

This annual compendium of events and progress has been published since 1915. The Year Book Corporation

which publishes it is made up of 46 learned societies, including the American Public Health Association.

In the 1947 edition of more than 1,100 pages, 146 authors discuss 27 subjects under 7 main headings. The volume is "an elbow companion for everyone interested in contemporary events." It is source material for an appraisal of the age in which we live and an instrument for keeping informed on America, which is the fundamental duty of citizenship.

The article on Public Health, one of seven included under the Medical Sciences under the larger title of "Science: Application and Principles," is written by William R. Willard, M.D., of the Yale University School of Medicine.

A valuable feature of the *Year Book* is a list of periodicals and of cognate societies and research institutions in each of the seven main subjects of the volume.

MARTHA LUGINBUHL

Planning for the Care of the Chronically Ill in New York State —*Legislative Document (1946) No. 66A. P.P. 131—By New York State Health Preparedness Commission. Albany: Williams Press,* 1946. 85 pp.

This Legislative Commission with many years of study of health and welfare problems behind it has prepared a document which, while directed primarily to conditions in New York State, should serve as a useful guide to procedure and planning in other states.

The Commission was buttressed by strong advisory committees on Planning, Medical Education and Research and Nursing Care. The Commissioners of the State Departments of Health and of Social Welfare were ex-officio members of the Commission.

The report is well organized and readable. It is replete with charts, graphs, and tables. The summary of licensure of nursing homes in 20 states, together with detailed reporting on planning for the care of the chronically ill in other states (Connecticut, Illinois, Indiana, Massachusetts, and New Jersey) provide useful information.

Under the following headings the findings and conclusions are stated: Convalescent Care, Medical Domiciliary Care, Nursing Homes, Voluntary Homes for the aged.

This report will be helpful to all those who are now facing the problem of providing for the care of the chronically ill in their own homes, hospitals, nursing homes, and elsewhere.

ELLEN C. POTTER

Advances in Internal Medicine. Volume II—*Edited by William Dock and I. Snapper. New York: Interscience,* 1947. 642 pp. Price $9.50.

Those who expect this volume to be a year book of internal medicine will be disappointed. The volume consists of thirteen articles, of the review type, dealing with subjects in which advances are being made. The topics include electrocardiography, circulation of blood, penicillin treatment, the Rh antigen, megaloblastic anemias, and nutrition, as well as fields of interest to the internist. The latter include angiography, surgery for hypertension, and lung disease, insect control, and problems related to aviation and deep sea diving.

Well selected, the articles are comprehensive; they are thoroughly done by experts. The volume will be of interest to internists, those who wish to become internists, and those who want to know how and where internal medicine is advancing. W. A. DAVIS

Food, Nutrition, and Health—*By E. V. McCollum, Ph.D., Sc.D., and J. Ernestine Becker, M.A. (6th ed.) Baltimore: Johns Hopkins University,* 1947. 146 pp. Price, $2.00.

This is the sixth edition of a little book that has been well received in the

past and which serves a useful rôle in informing health personnel and interested laymen in modern nutrition. The current edition has been mostly rewritten and includes an account of many recent findings in nutrition. It is by no means a textbook or reference book in nutrition, but it is not intended as such. There are no references and practically no discussion. It is well written and in non-technical language.

In addition to the usual sections on various nutrients there are chapters on certain foodstuffs, diet in relation to anemia, pregnancy, and lactation, weight control, preventive dentistry, etc., and suggestions on conserving nutrients in foods and menu planning. Many of these sections are very brief, amounting to only one or two pages. The reviewer questions the advisability of including in a book of this type any reference to such vague entities as vitamins B_3, B_4, B_5, B_7, etc.

On pages 42 and 43 is a table entitled "Summary of the Vitamins of Known Significance to Humans," which includes vitamin E, pyridoxine, biotin, and vitamon P which, so far as the reviewer knows, have no established rôle in human nutrition. A paragraph on fat and water appears to have been mislaid in the chapter on mineral elements.

There is a need for a book such as this one and it is well written. Public health would be improved if more public health personnel knew what was between the covers of this little book.

FREDRICK J. STARE

American Foundations and Their Fields—Part I—*Edited by William B. Cherin. New York: Raymond Rich and William Cherin Associates*, 1947. 58 pp. Price, $6.00 (4 parts).

Public health workers will have reason to be grateful to the authors for an up-to-date review of American Foundations and their programs. This represents a sequence of publications originally presented by the Twentieth Century Fund and more recently by Raymond Rich Associates.

The survey has been broken down into four parts. This volume includes the Foundations' fiscal years ending February 28 to July 1, 1947. Each Foundation has been asked to provide information relating to the date of its establishment, the source of its funds, its purposes, the methods of operation, the direct activities, the financial data, the availability of reports, and the list of officers. It is notable that a considerable number of these agencies which enjoy tax exemption publish no reports and some refuse all information. It would appear to the reviewer that such information as is here presented should be mandatory for all foundations as a condition of the benefits which they enjoy.

REGINALD M. ATWATER

Food Regulation and Compliance. Volume II—*By Arthur D. Herrick. New York: Revere Publishing Co.* 655 pp. Price, $10.00.

In volume I of this work the author, after briefly recounting the early history of legislation for food control, presented a comprehensive discussion of regulation through labeling requirements. In the first volume as in this second book, the discussion is chiefly limited to the Federal Food, Drug and Cosmetic Act. Some few other topics are given mention, such as the Federal Meat Inspection law and the problem of second-hand and used containers.

This second volume deals primarily with the problems of adulteration and contamination of foods, of control of permitted colors and the methods of enforcement and prosecution, all from the standpoint of the Federal Food, Drug and Cosmetic Act. There is a well written chapter on Insanitary Premises and Processing which will be of special interest to the public health official concerned with food control. In

this part of the book the author shows how the former limited federal control over food products solely by means of chemical and bacteriological tests was weak and ineffective, and now through the new sections of the law giving the Food and Drug Administration authority to inspect plants and provide sanitary standards for production and distribution the federal control has been greatly expanded and enhanced. However, these sections of the federal law become operative (giving authority for plant inspections and setting of sanitary standards) only after it has been established "that proper sanitation is so lacking that the food (a) may become contaminated with filth, or (b) may have been rendered injurious to health."

The book deals fully with the administrative practices and enforcement methods of the U. S. Food and Drug Administration. It is a volume that will be especially valuable to health officials who come in contact with the federal food control activities. The book contains the organization of the U. S. Food and Drug Administration and, in an appendix, provisions of the Federal Food, Drug and Cosmetic Act relating to foods.

SOL PINCUS

Fundamentals of Immunology—*By William C. Boyd, Ph.D. (2nd ed.) New York: Interscience Publishers,* 1947. 503 pp. Price, $6.00.

The author addresses himself "mainly to students and research workers." At the end of each of the eleven chapters the pertinent material is presented in condensed form as a summary. These brief accounts when read consecutively without reference to the text constitute an excellent picture of the current views of the principles of immunology.

In the full text the author has taken care to introduce each new concept with sufficient elementary explanation to permit the student new to the subject to grasp the ideas. However, the elementary material is usually brief enough to avoid interference with the use of the text by research workers who wish to find more advanced material.

The eleven chapters include discussions of "cell antigens," "blood groups," "anaphylaxis and allergy," allergy and immunity as regards bacteria, viruses, and parasites, and "laboratory and clinical technic." The subject of skin tests for susceptibility and immunity is treated rather briefly in an appendix to one of the chapters. The bibliographies at the end of the chapters are extensive.

This book is well written. It should accomplish the author's objective of presenting the fundamentals of immunology to students and research workers.

J. C. SNYDER

Medicine for Moderns—*By Frank G. Slaughter, M.D. New York: Julian Messner,* 1947. 246 pp. Price, $3.50.

Medicine for Moderns is a frank, easily read discussion of the concepts, mechanisms, therapeutic approaches, and hopes of psychosomatic medicine. Written in popular style for educated laymen, it succeeds in avoiding both the extreme sensationalism so common in books of this nature, and the insult of "talking down." Dr. Slaughter's intense enthusiasm, as a convert trained primarily in surgery, leads him into some wishful thinking in relation to the curative and preventive values of personality psychometric testing. The essentiality of individualization warrants somewhat greater emphasis. However, the material is sound and well presented.

Following a brief description of the anatomy and physiology of the autonomic nervous system, the author takes up the more obvious of the psychogenic illnesses: peptic ulcer, spastic colitis, hypertensive disease, asthma, and the like. There is an obvious appeal for popularity in the emphasis placed upon the psychogenic factors responsible for

impotence and frigidity. One misses accentuation of the important fact that all these disorders are characteristically derived from varied and multiple etiologic factors, and that continued anxiety is but one of several influences.

The book can be recommended as background reading for the laity, and may also be of value to those medical professionals who are asymmetrically organicists, insisting that that which cannot be seen does not exist.

EDWARD J. STIEGLITZ

Sports for the Handicapped—*By George T. Stafford. (2nd ed.) New York: Prentice-Hall,* 1947. 334 pp. Price, $5.00.

There are few more satisfying fields of endeavor within physical and health education than working with handicapped students or with disabled patients. Stafford, in this exceedingly helpful second edition has pointed the way to a continuous betterment of programs which deal with the atypical. His book will be useful wherever people are concerned about the organic, psychological, and social rehabilitation and compensations of those who must seek to live most with what they have.

Stafford has long believed, and demonstrated, that sports can be adapted to the disabled. Prior to the war physical education departments in colleges and in some high schools were moving in this direction, but not as rapidly as the need demanded. The human wreckage produced by the war gave impetus to experimentation and, through the efforts of people like Stafford, Daniels, Esslinger, Kelly, Elkins and others, a full measure of good was done the disabled by ingeniously adapting sports or creating new ones for these very special purposes.

This second edition presents excellent material for use with the personality or psychologically handicapped, the amputee, the deaf, the paralyzed, those with faulty body mechanics, malnutrition, circulatory misbalances, and spinal deviations. There are useful suggestions throughout for physicians and physical educationists. It should be read, and used widely. DELBERT OBERTEUFFER

Artificial Pneumothorax in Pulmonary Tuberculosis—*By T. G. Heaton, M.B. (2nd ed.) New York: Macmillan,* 1947. 292 pp. Price, $4.50.

The revised edition (1947) of this book presents a concise and selective report of an important part of a system of collapse therapy in phthisiotherapy. The contents are contained in 16 chapters carefully arranged and chosen to lend a proper continuity to the subject. The literature on artificial pneumothorax is enormous and the author's selection and classification of authoritative references represent careful study and timely abstracts. The statistical data are reduced to a minimum consistent with satisfactory explanations of the text. The departure from complicated tables is welcomed by the busy practitioner.

The author's excellent training and experience permit a crystallizing of thought on many controversial points, and his own expressed opinions reflect the good judgment of the careful clinician.

The public health physician interested in tuberculosis prevention and control will find in this book a ready "up to the minute" reference on the latest scientific thoughts about the treatment of pulmonary tuberculosis by pneumothorax. It will be particularly welcome in the tuberculosis division or clinics of the health department, and more especially if such outpatient department service includes post-sanatorium pneumothorax supervision and refill treatments.

It would be unusual indeed if every reader of this book would agree with the author on all debatable points. The purpose, however, is served in presenting

accurate thought-provoking material to serve either as a supplement to knowledge of the subject already gained or to stimulate the reader to obtain further detailed knowledge of pneumothorax therapy beyond the limitations of the book itself.

The reviewer believes that this stimulating book from Canada is a real contribution to the field of tuberculosis therapy and should be read, understood, and made available for reference by all physicians actively engaged in the practice of tuberculosis or in the general field of pulmonary diseases.

JOHN A. CARSWEL

Physiology and Pathology of the New-born—*Compiled by A. N. Antonov, M.D. Monographs of the Society for Research in Child Development. Vol. X Serial No. 41, 1945, No. 2. Washington, D. C.: Society for Research in Child Development, National Research Council,* 1947. 217 pp.

This volume is a publication of the Society for Research in Child Development of the National Research Council. It is a bibliography or index of material on the physiology and pathology of the new-born for the period 1930–1940. A. N. Antonov, M.D., of Leningrad, has made a valuable contribution by compiling this extensive bibliography concerning scientific articles from all centers of the world. At even a glance the reader is impressed with the international interest in the physiology and pathology of new-born infants.

The table of contents shows 38 sections, with such titles af Fetus, The Influence of Pregnancy and Labor on the New-born, Anthropometric Data, Metabolism of the New-born, Congenital Abnormalities and Malformations, Birth Injuries, The Respiratory System, Other Systems, and Infectious Diseases. The book is valuable as reference material.

The large number of scientific articles on physiology and pathology of the new-born is truly impressive and shows the vast amount of work that was done between 1930 and 1940 preparing the way for further scientific knowledge and its application today.

MARTHA L. CLIFFORD

Industrial Environment and Its Control—*By J. M. Dallavalle. New York: Pitman Publishing Company,* 1948. 225 pp. Price, $4.50.

This is an authoritative work on industrial hygiene presenting the engineering phases of environmental control in the prevention of occupational hazards, and it is written principally for engineers. However, this book should be read not only by industrial hygiene engineers but also by industrial physicians who need to know the engineering phases of industrial health service and the extent to which the medical service must be backed up by competent engineering if satisfactory results are to be obtained.

The book has a notable preface which clearly states both the aims and scopes of environmental control as well as their limitations. The author discusses the influence of atmosphere, the estimation of atmospheric qualities, and the variations from the normal that constitute health hazards. Vibration, fatigue, illumination, and radiant energy are amply presented.

There is a discussion of the methods of ventilation and the design and construction of ventilating systems, exhaust systems, and dust collection systems, together with the control of bacterial infections.

Finally, there is an appendix which covers briefly regulations, standards, and desirable practices, including brief statements on medical service, first aid, physical examinations, and record keeping.

The author is to be commended on a most worth while book. A. J. LANZA

BOOKS RECEIVED

Listing in this column acknowledges the receipt of books and our appreciation to the senders. Space and the interests of readers will permit review of some, but not all, of the books listed.

ASEPTIC TREATMENT OF WOUNDS. Carl W. Walter, M.D. New York: Macmillan, 1948. 372 pp. Price, $9.00.

BACTERIOLOGY—A TEXTBOOK OF MICROORGANISMS. F. W. Tanner and F. W. Tanner, Jr. (4th ed.) New York: Wiley, 1948. 625 pp. Price, $4.50.

BASIC FACTS OF HEALTH EDUCATION. Selected Articles from the Ministry of Health. Bulletins which have appeared in the Pharmaceutical Journal, 1944–1947. London: Pharmaceutical Press, 1948. 193 pp. Price, 7s.6d.

THE CARE OF THE TEETH. PRE-NATAL AND IN INFANCY. G. Herbert H. Russell, M.B., Ch.B.L.D.S. Eng., Cheshire, England: John Sherratt & Son. 48 pp. Price, 2/net.

DETOXICATION MECHANISMS. THE METABOLISM OF DRUGS AND ALLIED ORGANIC COMPOUNDS. R. Tecwyn Williams, Ph.D. New York: Wiley, 1947. 288 pp. Price, $5.50.

FUNDAMENTALS OF HUMAN REPRODUCTION. Edith L. Potter, M.D. (1st ed.) New York: McGraw-Hill, 1948. 231 pp. Price, $3.50.

GIVE YOUR CHILD A CHANCE. Lenore Turner, New York: Georgian Press, 1948. 170 pp. Price, $1.50.

GOOD HEALTH IS GOOD BUSINESS. A Joint Subcommittee Report—Planning Pamphlets No. 62. Washington, D. C. National Planning Association, 1948. 44 pp. Price, $.25.

HEALTH OF ARC WELDERS IN STEEL SHIP CONSTRUCTION. Waldemar C. Dreessen, Hugh P. Brinton, Robert G. Keenan, Thalbert R. Thomas, Edwin H. Place and James E. Fuller. Washington: Supt. of Documents, 1947. 200 pp. Price, $.55.

INTRODUCTION TO HUMAN PHYSIOLOGY. William D. Zoethout, Ph.D. St. Louis: Mosby, 1948. 424 pp. Price, $4.00.

LABORATORY EXPERIMENTS IN PHYSIOLOGY. W. D. Zoethout, Ph.D. (4th ed.) St. Louis: Mosby, 1948. 263 pp. Price, $3.00.

THE MARYLAND MEDICAL CARE PROGRAM. Report of the Staff of the Subcommittee on Medical Care, Committee on Administrative Practice, American Public Health Association. Howard M. Kline, Ph.D., Milton Terris, M.D., Cozette Hapney and Nathan A. Kramer. New York: American Public Health Association, 1948. 151 pp.

MENTAL HEALTH IN MODERN SOCIETY. Thomas A. C. Rennie, M.D., and Luther E. Woodward, Ph.D. New York: The Commonwealth Fund, 1948. 424 pp. Price, $4.00.

MILK PRODUCTS. W. Clunie Harvey, M.D., and Harry Hill (2nd. ed.) London: H. K. Lewis & Co., 1948. 343 pp. Price, 30s net.

NATIONAL CONFERENCE OF SOCIAL WORK 1947, PROCEEDINGS OF THE. Selected Papers—74th Annual Meeting, 1947. New York: Columbia University Press, 1948. 512 pp. Price, $5.00.

NEW YORK CITY'S BABY BOOK. New York: Department of Health. 136 pp.

PAMPHLETS THAT PULL. Alexander Crosby. New York: National Publicity Council, 1948. 33 pp. Price, $1.00.

PATHOLOGY OF TUMOURS. R. A. Willis, D.Sc., M.D. St. Louis: Mosby, 1948. 992 pp. Price, $20.00.

PHYSIOLOGICAL EFFECTS OF TIME SCHEDULE WORK OF LUMBER-WORKERS. Acta Physiologica Scandinavica, Stockholm, 1946. Distr. by Affärsekonomi, Stockholm 3, Sweden. 137 pp. Price, Swed. Crowns, 12:-.

PRINCIPLES OF MEDICAL STATISTICS. A. Bradford Hill, D.Sc., Ph.D. (4th ed.) London: The Lancet Limited, 1948. 252 pp.

PSYCHOBIOLOGY AND PSYCHIATRY. Wendell Muncie, M.D. (2nd. ed.) St. Louis: Mosby, 1948. 620 pp. 70 illus. Price, $9.00.

RECENT PROGRESS IN HORMONE RESEARCH. Vol. II. Edited by Gregory Pincus. New York: Academic Press, 1948. 427 pp. Price, $8.00.

SAFETY FOR THE HOUSEHOLD. National Bureau of Standards Circular 463. Washington, D. C.: U. S. Govt. Ptg. Office, Supt. of Documents, 1947. 191 pp. Price, $.75.

THE SCIENTIFIC PAPER. HOW TO PREPARE—HOW TO WRITE IT. Sam F. Trelease. Baltimore: Williams & Wilkins, 1947. 152 pp. Price, $2.00.

THE STUBBORN WOOD. Emily Harvin. New York: Ziff-Davis, 1948. 365 pp. Price, $3.00.

U. S. GOVERNMENT MANUAL 1946. Division of Public Inquiries Government Information Service. Bureau of the Budget. Washington, D. C.: Supt. of Documents. Govt. Ptg. Office. 708 pp. Price, $1.00.

VETERINARY HELMINTHOLOGY AND ENTOMOL-

OGY. H. O. Monning, B. A., Dr. Phil., B.V. Sc. (3rd ed.) Baltimore: Williams & Wilkins, 1947. 427 pp. Price, $9.00.

VITAMINS AND HORMONES. Vol. V. Advances in Research and Application. Edited by Robert S. Harris and Kenneth V. Thimann. New York: Academic Press, 1947. 478 pp. Price, $7.50.

WESTERN BRANCH ANNUAL—AMERICAN PUBLIC HEALTH ASSOCIATION. A Resume of Papers Presented at the First Post-war Meeting. Berkeley, Calif.: Western Branch, A.P.H.A. 95 pp. Free.

YOU AND YOUR DOCTOR. Benjamin F. Miller, M.D. New York: McGraw-Hill Book Co., 1948. 183 pp. Price, $2.75.

THE FOLLOWING REPORTS HAVE BEEN RECEIVED

CLEVELAND'S HEALTH. Annual Review 1946. City of Cleveland: Department of Public Health and Welfare.

AN EVALUATION OF METHODS FOR INTEGRATING PUBLIC HEALTH IN THE BASIC CURRICULUM OF SCHOOLS OF NURSING IN GREATER BOSTON. Mary Lee Brown, R.N. Boston: Harvard School of Public Health, 1947.

THE GRANT FOUNDATION, INC. Report from the Inception of the Foundation November 2, 1936, to October 31, 1947. New York: The Grant Foundation, Inc. 16 pp.

THE INSTITUTE OF INTER-AMERICAN AFFAIRS. Food Supply Division—A Summary Report 1942–1947. Washington, D. C.: Inter-American Affairs, 1947. 88 pp.

METROPOLITAN HEALTH COUNCIL. Annual Report Year Ending February 29, 1948. Columbus, Ohio: Metropolitan Health Council. 11 pp.

SOCIAL SCIENCE RESEARCH COUNCIL. Annual Report 1946–1947. New York: Social Science Research Council. 91 pp.

STATE AND TERRITORIAL HEALTH OFFICERS AND THE U. S. PUBLIC HEALTH SERVICE, 46th Conference of. Washington, D. C.: Social Security Building, 1947. 77 pp.

WISCONSIN COOPERATIVE SCHOOL HEALTH PROGRAM. Third Annual Report to the W. K. Kellogg Foundation and the Wisconsin Education Association 1946–1947. Wisconsin: State Department of Public Instruction and State Board of Health. 34 pp.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

"More About Our Ignorance"—Would you like to see a paper that, by example, tells you how to prepare a readable report in addition to passing on some information to you? Then search out this particular British health journal. The paper is about the much written up colds research they have been carrying on with human volunteers.

ANDREWS, C. H. The Common Cold. M. Officer 79, 6:55 (Feb. 7), 1948.

Incidental Intelligence—Butylacetanilide repels ticks for 10 days and works against chiggers, too—just in case you wish to protect yourself against either of these pests. You dip exposed clothing in a solution, it seems.

BRENNAN, J. M. Field Tests with Tick Repellants. Pub. Health Rep. 63, 11:339 (Mar. 12), 1948.

Largely Undeserved Praise—If you would like to enjoy a mild case of swelled head, read this Britisher's account of his visit to America last fall. He saw everything that was good and nothing that was bad, apparently. I cannot forego just one quote: "Almoning, or as it is called in America, medical social work is developing apace, and a chair in this subject has been established at the University of Yale."

DALEY, A. Impressions of America. Public Health. 61, 5:77 (Feb.), 1948.

Muscles and Emotions—Fitness seems to be the ability to perform the

tasks of daily living without undue fatigue, and the qualities making this possible are those of the total personality for physical and psychologic factors cannot be disassociated. This definition works pretty well whether applied to athletes, laborers, sedentary workers, the handicapped or the aged. Measuring fitness is a complicated procedure not lightly to be attempted.

DARLING, R. C., *et al.* Physical Fitness. J. A. M. A. 136, 11:764 (Mar. 13), 1948.

Thirty Million Hungry Children—Says our President—back from a tour of Europe—the greatest need of children everywhere over there is MILK and more MILK. Someone should tell this to our statesmen who refuse us the margarine that would release for these children some of the surplus milk now being churned into unneeded butter.

ELIOT, M. M. The Need of the Children. Survey Graphic. 37, 3:140 (Mar.), 1948.

Children First in Every Country—We have widespread evidence in Europe, this British reporter writes, of the unrest, bitterness, disease, and destitution existing among those who suffered as children in the early war years and are now approaching manhood. But the record is not all black, he concludes.

ELLIS, R. W. B. Effects of War on Child Health. Brit. M. J. 4544:239 (Feb. 7), 1948.

Of Human Interest—There isn't much here but what there is, is 22 Karat. Good public speakers never forget, the professor says, that "people are interested in people." Send out speakers, he advises, who can make people laugh, but he doesn't tell you where to get them.

HANNA, M. Good Public Relations Requires Good Public Speakers. Am. J. Nurs. 48, 3:163 (Mar.), 1948.

This Hits Babies Hardest—Crowding, flies, improper excreta disposal, and bad personal hygiene all were associated with diarrheal disorders caused by *Shigella* infection. But water, milk and other foods did not seem to be implicated.

HARDY, A. V. and WATT, J. Studies of the Acute Diarrheal Diseases. Pub. Health Rep. 63, 12:363 (Mar. 19), 1948.

Silver-Lining Department—Here is a striking bit of economics passed along to you for what it is worth; the average stay in hospital is now a third of what it was three decades ago, and it costs twice as much per day. An illness that used to cost the victim $150 now costs him $100 for his hospitalization.

MACLEAN, B. C. The Hospital as a Community Health Agency. Pub. Health Nurs. 40, 3:115 (Mar.), 1948.

After Twenty Years—Physical defects discovered in New York State school children dropped in incidence, during the past two decades—except dental defects. They increased.

MAXWELL, C. H., and BROWN, W. P. The Age-Incidence of Defects in School Children, Their Changing Health Status. J. Sch. Health 18, 3:65 (Mar.), 1948.

Thought-for-the-Month — Trickling down from on high comes the rain of life-giving subsidies—from federal treasuries to states and from states to the communities—to support competent local health services. What is needed in return is a welling-up from below—from local workers to state commissioners to federal officers—of grassroots advice to avoid arbitrary and bureaucratic rulings that may lower the effectiveness of this productive partnership.

MERRILL, M. H. Federal-State-Local Relationships in the Financing of Local Health Services. Pub. Health Rep. 63, 8:244 (Feb. 20), 1948.

In Union There is You-Know-What—America's professional men and

women are sharing neither the profits of business nor the bargaining power of labor, this authority says. The A.N.A. is demonstrating how better incomes can be secured without sacrificing professional ethics or resorting to demeaning tactics. Is this assertion of any interest to you?

NORTHRUP, H. R. Collective Bargaining and the Professions. Am. J. Nurs. 48, 3:141 (Mar.), 1948.

Warning Against Clock-Training—Even though you are an engineer or a technician or a statistician, and even though you have no babies of your own, you should read this paper. As the first discussant says, "It shows that material can be presented in simple language and yet be of the highest scientific value." And that, Brother, is something you and every one of us jargoneers needs to learn.

SPOCK, B. Common Behavior Disturbances in the First Two Years of Life. J.A.M.A. 136, 12:811 (Mar. 20), 1948.

To Measure Under-Reporting—Promising to be the first of a series of discussions on the adequacy of local morbidity reporting practices and ways to increase completeness, this paper gives some hint of the present weakness and variables.

WEST, M. D. Morbidity Reporting in Local Areas. Pub. Health Rep. 63, 11:329 (Mar 12), 1948.

THE 76TH ANNUAL MEETING
Boston, Mass., November 8–12, 1948
Hotel Reservation Form

The hotels listed below have rooms available for Association delegates at the rates indicated. Please note that NO RESERVATIONS WILL BE ACCEPTED DIRECTLY BY HOTELS. Make your reservation through:
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Gardner	2.50– 5.00	4.00– 6.00	4.00– 6.00	7.50
Hemenway	3.00– 3.85	4.40– 5.50	4.40– 5.50	None
Kenmore	4.00– 6.00	6.50– 8.50	6.50– 8.50	10.00– 12.50
Lenox	3.75– 5.00	5.50– 6.50	7.50	10.00– 16.00
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Minerva	3.00– 5.00	4.00– 6.00	5.00– 7.00	5.00– 8.00
Myles Standish	3.85– 6.50	5.50– 7.50	6.50– 7.50	6.50– 15.00
Parker House	4.00– 6.50	6.25– 8.50	7.50– 10.00	14.00– 16.00
Puritan	4.40– 6.60	6.60– 8.80	9.90	13.20– 17.60
Sheraton	4.00– 4.50	7.00– 8.00	7.00– 8.00	7.00– 16.00
Somerset	5.00– 9.00	7.00–11.00	7.00– 11.00	10.00– 20.00
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Touraine	4.00– 6.00	6.00– 9.00	7.50– 9.00	14.00– 16.00
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ASSOCIATION NEWS

SEVENTY-SIXTH ANNUAL MEETING
AMERICAN PUBLIC HEALTH ASSOCIATION
BOSTON, MASS., NOVEMBER 8–12, 1948

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Harle V. Barrett, M.D., 408 South Second St., Independence, Kan., Montgomery County Health Officer

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David B. Lepper, M.D., Bluefield, W. Va., Elected Member 1923, Elected Fellow 1927, Health Officers Section.

Marshall W. Meyer, M.D., M.P.H., Madison, Wis., Elected Member 1940, Elected Fellow 1947, Health Officers Section.

D.C.Y. Moore, M.D., Manchester, Conn., Elected Member 1920, Elected Fellow 1937, Health Officers Section.

Frances Stern, Boston, Mass., Elected Member 1921, Elected Fellow 1935, Food and Nutrition Section.

Ralph E. Tarbett, Takoma Park, Md., Elected Member 1928, Elected Fellow 1930, Engineering Section.

Howard S. Allen, M.D., Woodbury, Conn., Elected Member 1944, Health Officers Section.

James F. Arbuckle, White Plains, N. Y., Elected Member 1946, Public Health Education Section.

Joe Davis, Seattle, Wash., Elected Member 1943, Laboratory Section.

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Harley A. Bunner, Atlanta, Ga., Elected Member 1946, Laboratory Section.

W. W. Hume, M.D., Beckley, W. Va., Elected Member 1931, Health Officers Section

DR. CARL BUCK JOINS UNIVERSITY OF MICHIGAN FACULTY

Carl E. Buck, Dr.P.H., was appointed to the staff of the Committee on Administrative Practice, American Public Health Association, March 31, 1931. During most of the intervening years he has served as Field Director for the Association and the committee. He has now resigned from this position to become Resident Lecturer in Public Health Practice at the University of Michigan School of Public Health, Ann Arbor. His special interest will continue in the field of state and local health administration.

Dr. Buck's host of friends throughout the North American Continent will be glad to know that his unusual talents and his wealth of practical experience have been transferred to a point where his influence may be extended through his students to influence public health practice in the future. He has acquired the kind of information and experience possessed by almost no other person during the last 17 years. His mark has been made on the Committee on Administrative Practice, on the Association, and upon local and state health services in North America.

Besides many studies and reports which Dr. Buck has made on local health agencies, both official and voluntary, there should be recorded the unprecedented series of state studies conducted by Dr. Buck during the last 11 years. Beginning with a study of Ohio in 1931, Dr. Buck's interests were extended through studies in Arizona in 1936; Massachusetts, 1936; Oklahoma, 1938; Michigan, 1939; Florida, 1939; Alaska, 1940; Louisiana, 1941; Manitoba, 1941; Illinois, 1942; Washington, 1942; Alaska (re-study), 1943; California, 1943; Oregon, 1944; Utah, 1944; Idaho, 1945; Colorado, 1946; Wyoming, 1946; Montana, 1946; North Dakota, 1947. After completing a second study of Massachusetts during the fall of 1947, Dr. Buck finished his term of service with the Association by a re-study of the California State Department of Health. Dr. Buck has announced that he will continue an interest in field work in a consulting capacity.

The Committee on Administrative Practice will plan for occasions during the 76th Annual Meeting of the Association in Boston, November 8–12, when Dr. Buck's friends will have an opportunity to greet him.

Succeeding Dr. Buck as the Association's Field Director is Roscoe P. Kandle, M.D., M.P.H., who was associated with Dr. Buck during 1946 and who left the Association staff to become Director of the Bureau of Preventable Diseases with the New Jersey State Department of Health in Trenton. Dr. Kandle is well equipped to carry on. With him is associated Robert E. Rothermel, M.D., M.P.H., as Assistant Field Director. Both Dr. Kandle and Dr. Rothermel are currently engaged in a survey of the State of Pennsylvania at the request of the Pennsylvania State Department of Health and Governor Duff.

GIFT TO COMMITTEE ON CHILD HEALTH

At the first meeting of the Association's new Committee on Child Health in New York on March 20, announcement was made of a gift of $300.00 from the residual funds of the Association of Women in Public Health.

The Association of Women in Public Health, first organized in 1920, voted to disband late in 1947 and to join forces fully with the American Public Health Association. Its Treasurer, Dr. Susan M. Coffin, referred to the gift as a "humble dowry" presented at the time of what Dr. C.-E. A. Winslow termed her Association's "marriage with the American Public Health Association."

The new Committee on Child Health at its first meeting explored areas of cooperation with such agencies as the American Academy of Pediatrics, the Children's Bureau, the National Institute of Health, school health organizations, and the Association's Standing Committees on Professional Education, Research and Standards, and Administrative Practice.

A.P.H.A. membership application blank on page XXIX

EMPLOYMENT SERVICE

The following pages present information for those seeking qualified public health personnel and for those seeking positions in public health.

This is a service of the Association conducted without expense to the employer or employee.

Address all correspondence to the Employment Service, A.P.H.A., 1790 Broadway, New York 19, N. Y., unless otherwise specified.

(Supplemental to list in April Journal)

Positions Available

Epidemiologist for responsible statewide program in communicable disease control requiring an experienced health officer.

Senior Bacteriologist for responsible positions in state public health Laboratories. Master's degree or experience necessary. Monthly salary $250–$315.

Junior Bacteriologist for positions available in state public health laboratories. Bachelor's degree with major in bacteriology or immunology required. Monthly salary $210–265. Contact Personnel Office, Kansas State Board of Health, Topeka, Kans.

Employment Opportunities in Arizona
Wanted—Medical and Other Professional Personnel in Arizona

Director of Tuberculosis Control Division, $6,000 a year
Director of Maternal and Child Health Division, $6,000 a year
Two Directors of Local Health Units, $5,100 a year
Maternal and Child Health Clinician, $5,100 a year
Clinician in the Special Field of Cancer, $5,100 a year
Director, Hospital Survey, Planning and Construction, $6,000 a year
Nutrition Consultant, $3,360 a year
Dental Hygienist, $2,400 a year
Assistant Director of Health Education, $2,880 a year
Psychiatric Social Work Consultant, $3,360 a year
Consulting Psychologist, $3,360 a year
Senior Psychologist, $2,880 a year
Junior Psychologist, 2,400 a year
Personnel Officer, $3,000 a year
Vital Statistician, $2,880 a year

Public health program operates under a Merit System of Personnel Administration. For further information write to: J. P. Ward, M.D., Superintendent of Public Health, Phoenix, Ariz.

Public Health Nurse wanted with Public Health Certificate. Beginning salary $3,051 to maximum of $3,577. Car furnished. Permanent tenure, vacation and sick leave, 5 day week. For further information apply to the Civil Service Board, City Hall, Dearborn, Mich.

Nurse for Public School System of Mount Clemens. Beginning salary $3,200–$3,300 depending upon training and experience. Write **Box A-10.** Employment Service. A.P.H.A.

Public Health Administrator. A position combining that of public health engineering and the supervision of personnel, accounting and properties in a health unit containing 57 full-time positions. The area is adjacent to the District of Columbia, has a population of 130,000, and is both rural and suburban. Salary $4,400–$5,060, plus a ten per cent cost of living increase. Apply to Civil Service Commissioner of Montgomery County, Rockville, Md.

Chief Health Officer for City Health Department. Department operating efficiently. Required: M.D., preferably with public health training and experience. State experience and salary expected. Apply to City Manager, Bluefield, W. Va.

City Health Officer for New England industrial city of 20,000 population; full-time position with major emphasis on child and school health program; starting salary $6,000. Reply in detail to Board of Health, City Hall, North Adams, Mass.

Medical Director, Municipal Tuberculosis Hospital, bed capacity 115. Permanent, full time. Salary $4,620 with full maintenance. Reply Box 583, Fall River, Mass.

Physician, as Chief of the Bureau of Tuberculosis in charge of all public health tuberculosis activities (no institutional work). Salary $10,380 plus $25 cost of living monthly bonus. Write to the President, Board of Health, Territory of Hawaii, Honolulu, Hawaii, by airmail.

Physician as Director City-County Health Department, Eau Claire, Wis., population 56,000; staff of 14; ideal

offices and laboratory. Salary for man with degree in public health $7,500 plus 8¢ per mile travel. Write City-County Health Department, Safety Building, Eau Claire, Wis.

Supervising Nurse with certificate in public health nursing. Salary range $260–$300. Car furnished. Provision for vacation, sick leave, retirement benefits, permanency. For further particulars write Charles A. Neafie, M.D., Director, Department of Public Health, Pontiac 15, Mich.

Supervisor of Public Health Nurses. Baltimore County Health Department. Urban, suburban, and industrialized areas. Generalized service; director, four supervisors, 36 field nurses. Degree and experience required. Salary $3,100 to $3,600; for special preparation in child hygiene, venereal disease, mental hygiene, or orthopedics, $3,600 to $3,900. Retirement plan; 1 month vacation; 5 days a week. For use of personal car, an allowance of 7¢ per mile. Write to Dr. William H. F. Warthen, Health Officer, Baltimore County Health Department, Towson 4, Md.

Public Health Nurses for attractive rural area in northern Michigan within short distance of several urban centers. Opportunity for supervised experience and university study. Salary excellent, dependent upon experience and qualifications; systematic increments, 40 hour week, liberal travel allowance. Write Director, Eaton County Health Department, Charlotte, Mich.

Wanted for City Health Department. Midwest. **Public Health Physician.** Salary $370 to 415 per month plus $30 per month for using his own car.

Epidemiologist, (Physician), salary $410 to $455 per month plus $30 per month for using own car. Both these positions require a license to practice medicine in Ohio or ability to obtain such license if selected for the position.

Senior Bacteriologist, Public Health Laboratory Service. (Male or female.) Salary $420 to $520 per month.

Write **Box A-9.** Employment Service. A.P.H.A.

Public Health Staff Nurses for Linn, Yamhill, and Union Counties. Applicants must have had at least one year in approved program of study in Public Health Nursing. Under Merit System. Salary range $2,700–$3,300 plus travel allowance. Address correspondence to: Dr. Harold M. Erickson, State Health Officer, Portland 5, Ore.

Community Health Educator for Midwestern city. Demonstration program under joint sponsorship of city health department and a local voluntary agency. Program will eventually be absorbed by the official agency. University center. Challenging opportunity of demonstrating value of health education to community. Write **Box A-13.** Employment Service. A.P.H.A.

Public Health Nurse: Generalized public health nursing program in progressive official agency in rural-suburban area adjoining Washington, D. C. Beginning salary $2,400. Trainees accepted. Fifteen day vacation and sick leave, 35½ hours per week. Mileage allowed for use of personal car. Write Director of Nurses, Montgomery County Health Department, Rockville, Md.

Director with supervising experience in public health nursing to direct newly reorganized visiting nurse association in industrial city of 22,000. Salary, car allowance and other details upon request. Write **Box A-14.** Employment Service. A.P.H.A.

Full-time Health Officer, town of 26,000, convenient to medical and cultural centers, salary $6,000 plus mileage. Write: Chairman, Board of Health, Milford, Conn.

Public Health Nurse. Salary range $2,640–$3,120 (probably more beginning July 1). One year of postgraduate public health nursing training. Generalized service. Merit system and good personnel policies. Write: Division of Public Health Nursing, Kern County Department of Public Health, P. O. Box 120, Bakersfield, Calif.

Alaska Territorial Department of Health. Health Education Consultant wanted. Salary range $4,104–$4,644; minimum requirements college degree and one year graduate work in public health. Experience: one year full-time paid employment in public health education plus additional one year employment in any of allied fields. Write Box 1931, Juneau, Alaska.

Hearing and Vision Consultant. Minimum of two years' practical experience in hearing and vision programs; college graduate plus one year graduate training in psychology, speech, or related field with studies of handicapped children; $3,360 to $4,260. Civil Service status. Retirement. Permanent. Apply to: Harold M. Erickson, M.D., State Health Officer, Oregon State Board of Health, 1022 S.W. 11th Ave., Portland 5, Ore.

Qualified Public Health Nurse for itinerant work in tuberculosis in areas without local public health nursing services. Beginning salary $230 per month with $100 expense account. Furnish own car. Write: Public Health Nursing Section, State Dept. of Public Health, 515 Majestic Building, Denver 2, Colo.

Graduate in Bacteriology with some background in chemistry and experience in field of sewage and water research or treatment. To take charge of section in newly organized research project, Eastern U. S. Salary $3,200–$4,200 depending upon qualifications. Write **Box A-11.** Employment Service. A.P.H.A.

Nurses are needed for public health work in Texas. The program is conducted under a Merit System. Compensation range for Sr. Public Health Nurses from $2,277 to $2,553 per month. Compensation range for Jr. Public Health Nurses from $2,001 to $2,415. Compensation for War Emergency Nurses from $1,725 to 2,139. In addition to above salary; possible provision of approximately $600 car allowance annually. Write **Box A-12.** Employment Service. A.P.H.A.

District Health Officer. Two positions opened in progressive areas. Salary $7,440 to $9,120 per annum, plus traveling expenses. Applicant should possess three years of experience in professional medical work and one year graduate study in public health. Address inquiries to Arthur L. Ringle, M.D., State Director of Health, 1412 Smith Tower, Seattle, Wash.

Public Health Nurses. Several excellent positions available in full-time health departments in attractive areas in State of Washington. Salary range $2,640 to $3,360 per annum, plus traveling expenses. Applicant should possess one year of experience in public health work and one year of graduate study in public health. Address inquiries to: Anna R. Moore, R.N., Chief, Public Health Nursing Division, 1412 Smith Tower, Seattle, Washington.

City Health Commissioner for New England city; 55,000 population. Progressive city. Excellent environment. Salary $6,000. Reply in detail. Mayor's office, City Hall, Pittsfield, Mass.

Veterinarian for modern (quality) milk control program. Beginning salary $3,120, annual increments. Car furnished. Position provides for vacation, sick leave, retirement benefits, permanency. For further particulars write Charles A. Neafie, M.D., Director, Department of Public Health, Pontiac 15, Mich.

Pathologist, certified by American Board of Pathologists. Salary commensurate with ability and experience. Excellent opportunity. Large addition under construction. Write in detail to Superintendent, South Side Hospital, Pittsburgh, Pa.

Three openings for **Public Health Nurses** in Santa Cruz County. Salary $248–$260 monthly. General services in rural area. Must furnish own car, mileage paid. Apply to: Charles C. Gans, M.D., Santa Cruz County Health Department, 21 Front Street, Santa Cruz, Calif.

Openings in Public Health Department, New Mexico

Public Health Nursing Consultant	$325–$420
Public Health Nurse-Midwife Consultant	325– 420
Public Health Nursing Supervisor	250– 325
Public Health Nurse-Midwife	225– 290
Public Health Nurse	200– 260
Graduate Nurse	170– 200

Write to: Merit System Council, Box 939, Santa Fe, N. M.

Sanitary Engineer or Sanitarian, recent graduate, with engineering or science degree. Generalized sanitation program. City of 50,000 population. Car allowance. Vacation, sick leave and retirement benefits. Starting salary $3,600 per annum. Communicate with J. Burris Perrin, M.D., C.P.H., Health Officer, City of La Crosse, Wis.

Dental Hygienist. City of 50,000 population, twenty-four schools. Dental clinic. Starting salary $2,900 per annum with vacation, sick leave and retirement benefits. Communicate with J. Burris Perrin, M.D., C.P.H., Health Officer, City of La Crosse, Wis.

Neuropsychiatrist with pediatrics training to direct child guidance program being conducted by private foundation on state-wide basis, New Mexico. Must be diplomate of his board. Also assistant to Director, some general qualifications. Salaries at general level paid for similar services in comparable locations. New Mexico Health Foundation, 819 East Central, Albuquerque, N. M.

Health Officer for six county unit in Northeast Colorado with offices in Sterling. Estimated population of district 59,000. Budget provides for personnel of 16. Minimum salary $6,000 plus travel, and may be increased depending upon qualifications of applicant. Write Dr. Paul R. Hillebrand, Brush, Colo.

Physicians Wanted

The Tennessee Valley Authority announces openings for well qualified physicians. Training and experience in Public Health and Employee Medical Services are desirable. Salaries are based on 40 hour week schedule with periodic within-grade increases. Retirement, annual and sick leave benefits are provided. Interested candidates should write the Tennessee Valley Authority, Division of Personnel, Knoxville, Tenn.

Graduate Assistantships in Bacteriology

Candidates must enroll in Graduate School. Eight credit hours of graduate work leading to master's or doctor's degree permitted per semester. Stipend $1,000 for the academic year. Approximately 12 hours of laboratory teaching or preparations required per week. Send application for admission to Dean of Graduate School. Send personal data, transcript, and recommendations to Chairman of Department of Bacteriology, University of Michigan, Ann Arbor, Mich.

Examinations for Permanent Corps, U. S. Public Health Service

Examination for appointment to the Regular Corps of the U. S. Public Health Service for the grades of Assistant Sanitary Engineer and Senior Assistant Sanitary Engineer will be held in June, 1948. About 15 appointments are to be made. Application forms and additional information can be obtained from the Surgeon General, U. S. Public Health Service, Washington 25, D. C. Applications must be filed with the Surgeon General prior to June 1, 1948.

Applicants for the Assistant grade must be at least 21 years old and U. S. citizens, must possess a degree in engineering and must have had at least 7 years of education (exclusive of high school) and professional training or experience at least 2 years of which shall have been of a professional nature in public health or a related field.

An applicant for the Senior Assistant grade must meet the requirements for the Assistant grade and have in addition 4 more years of education and professional training or experience. A total of at least 6 years shall have been of professional training or experience in public health.

The starting yearly salary, with dependents, for the Assistant grade is $3,811 and for the Senior Assistant $4,351.

Laboratory openings requiring professional training and experience in State Health Department, East.

1. Research Microbiologist
2. Principal Biochemist
3. Senior Sanitary Chemist
4. Dairy technologist

Write Box **A-15.** Employment Service. A.P.H.A.

Qualified Director of Public Health Nursing program within Department of Nursing Education in College of Arts and Sciences in Eastern University. Annual salary $5,000. Write Department of Nursing Education, University of Rochester, Rochester 3, N. Y.

Public Health Nursing Education Director, leading to Director of Nurses position within a year. Salary $275–$300; good experience and background.

Also, opening for Public Health II, $230 beginning salary.

Write: Director, Weld County Health Department, Court House, Greeley, Colo.

POSITIONS WANTED

Academic position as **Professor of Bacteriology or Preventive Medicine.** Ph.D.; M.D. expected in spring, 1948. Sixteen years' experience in teaching and research (7 years as Professor of Bacteriology). Many publications including textbook of bacteriology for medical students. Write **Box Ph-2.** Employment Service. A.P.H.A.

Statistician-Administrator. Ten years' professional experience. Completing assignment in nation-wide health survey as chief of staff of 40–80 professional and clerical personnel doing following operations: coding, IBM tabulations, computations, analyses, etc. Intensive training in statistics, mathematics and accounting. Write **Box St-1.** Employment Service. A.P.H.A.

Physician, Woman, New York University graduate 1945, M.P.H. expected May, 1948; interested in position in or outside the U. S. Predominant interest communicable disease control. Write: **Box Ph-3.** Employment Service. A.P.H.A.

Engineer, ASCE, June; B.S., Public Health Eng.; M.S., Sanitary Eng.; desires to develop idea for "Model Communities" as adapted to rural areas in Southern Asia; South America. Interested in employment with organization or government engaged in redeveloping existing communities with regard to housing, sanitation, water supply, and general municipal facilities. Experienced overseas and domestic; single; 24. Write: **Box E-3**, Employment Service. A.P.H.A.

Advertisement

Opportunities Available

WANTED—(a) Several well qualified public health physicians and dentists for appointments to Germany, Austria, and Italy; headquarters of organization in Paris. (b) Assistant director; crippled children's commission; Middle West; $7,000–$8,200. (c) Director of medical and health service, national organization; duties consist of administering and planning medical service of eastern area; physician with administrative experience in public health required. (d) District health officer; duties consist of directing county health department and developing program; $7,400–$9,100; Pacific Northwest. (e) Public health officer; Korea. (f) Director of health service; 2,100 students; position carries faculty rank; town of 5,000 located short distances from several university centers; Middle West. (g) Director; city (200,000 population) health department; capable organizer required; Southwest; $10,000. **PH5-1** Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago 11.

WANTED—(a) Health educator; middle western city of 40,000; $4,500–$5,000. (b) Health educator to take charge of mobile unit and conducting health program in cancer; graduate nurse preferred; Middle West. (c) Public health statistician and, also, health educator; county department of health; Southern California. (d) Sanitary engineer to direct department serving population of 7,000,000; experience in water and malarial control required; M.A. degree and public health background essential; South America. (e) Assistant director of health education; municipal health department; West. (f) Sanitary chemist, B.S. degree in chemistry with four years' experience or Ph.D. in biochemistry; interesting position; health department of modern community in Southwest; would be connected with new hospital and research institute. (g) Health educator to direct division of county community fund and council of social agencies; newly created position; $4,000. **PH5-2** Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago 11.

WANTED—(a) Public health nurse with Master's degree and minimum of six years' experience to direct program in public health nursing connected with department of education, eastern university; appointment carries rank of assistant professor; eleven month year; $5,000. (b) Public health nurses for assignments in Europe; will work from Paris headquarters assigned to Germany, Austria, or Italy; well-rounded background in public health nursing required; $4,000–$5,000, transportation plus per diem covering differential in cost of living. (c) Student health nurse; young women's college; Pacific Coast. (d) Supervisor of nurses; health department of public school system; Bachelor's degree required; Middle West; $4,000. (e) Student health nurse; coeducational college, 1,800 students; well equipped infirmary of 60 beds; private apartment available; $3,600. (f) Industrial nursing consultant; duties consist of inspecting plants; dealing with management; public health training and industrial experience required; considerable traveling; headquarters in Chicago. (g) School nurse; fashionable residential town located short distance from Chicago; opportunity for continuing studies; unusual opportunity. **PH5-3** Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago 11.

Opportunities Wanted

Young dentist; three years, general practice; four years, director, public school dental clinics of large middle western city; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

Young public health specialist; recently received Master's degree in Public Health; state university; has had several years' experience as assistant, department of bacteriology, state department of health; for further information, please write Burneice Larson, Director, Palmolive Building, Chicago 11.

Public health nurse; B.S., M.A. degrees, public health nursing; six years, supervisor, state department of health; three years, maternal and child health nursing consultant; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

Sanitary engineer; Bachelor of Science in Civil Engineering (major: Sanitary Engineering), Master's in Public Health Engineering; ten years, director, department of engineering, state department of health; duties include responsibility for entire environmental sanitation in public health engineering program for a population of over million; for additional information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

Health educator; Ph.D.; six years, health educator nationally known organization; three years, health educator in industry; teaching experience; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

Public health physician; medical degree, eastern university; M.P.H. Johns Hopkins; 17 years' experience in public health field; during war held important assignment abroad; now director of health, city of 100,000; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

NEWS FROM THE FIELD

WORLD HEALTH ORGANIZATION

"Ever since it was proposed at the San Francisco Conference of 1945 and endorsed by the State Department, this country has taken an active part in the creation of a World Health Organization. We were represented at a preliminary health conference held in Paris in 1946 and later in the same year at the definitive International Health Conference which was held in this city by the representatives of sixty-eight nations and which decided that a World Health Organization was to be established as soon as twenty-six nations had signified their approval. Meanwhile an interim commission, with offices in Geneva and New York, has been demonstrating what such an organization can accomplish, one conspicuous example being the aid rendered in controlling a recent cholera epidemic in Egypt which threatened to involve the whole Near East. Last year the Senate passed a bill which would have made the United States a member of the World Health Organization and which was approved by the House Committee on Foreign Affairs.

"Despite this history, despite the support given to a World Health Organization by the American Public Health Association and virtually every public health authority, the Rules Committee of the House has seen fit to table the Senate's bill. No reason for an action which was taken behind closed doors. Twenty-two nations have already signed the covenant of the World Health Organization, and four more will do likewise in six or eight weeks. This means that an organization will be created, but that the United States will not be a member. The Rules Committee of the House owes the public an explanation. If it has any good reason for failing to approve the action of the Senate that reason ought to be presented. This country has always been a leader in supporting international efforts to control the spread of disease. At a time when most of continental Europe is undernourished and tuberculosis and other infections are increasing the United States cannot afford to give up that leadership and assume the role of an indifferent observer."—*New York Times*, Mar. 20, 1948.

1948 NORTH CAROLINA WATER WORKS OPERATORS' SCHOOL

The 1948 North Carolina Water Works Operators' School will be held June 7–11 at the University of North Carolina. This school is sponsored by the North Carolina Water Works Operators' Association and the North Carolina Section of the American Water Works Association and is conducted cooperatively by the School of Public Health and the Institute of Government of the university.

Students will be divided into 4 groups according to background, training, and present interest. Instruction will be given in 20 subjects, many of them common to 2 or 3 groups. Not only will technical problems such as filtration, chlorination, corrosion, water quality, hydraulics, and others be discussed but also records, personnel, and legal problems.

As in former years, the school is open both to North Carolina water plant personnel and to residents of neighboring states.

The final schedule of instruction and other information may be secured from Assistant Director, Institute of Government, Chapel Hill, N. C.

THE RETIRING AND INCOMING SURGEONS GENERAL OF THE U. S. PUBLIC HEALTH SERVICE

THOMAS PARRAN, M.D., Surgeon General of the U. S. Public Health Service, 1936–1948

1917–1948, Commissioned Officer in the Regular Corps, U. S. Public Health Service, serving until 1930 in 14 states on public health research and administrative assignments; 1930–1936, Commissioner of Health, New York State; Fellow of the American Public Health Association, and its President in 1937; 1939, winner of the Association's Sedgwick Memorial Medal "for distinguished service in public health"; 1947, winner of the Lasker Award of the Association "for outstanding contributions to the national health and to the World Health Organization"; 1946, Chairman of United Nations International Health Conference in New York City and Chairman of the U. S. delegation.

LEONARD A. SCHEELE, M.D., Surgeon General of the U. S. Public Health Service, April 6, 1948

Commissioned Officer in the U. S. Public Health Service, 1934; Health Officer, Queen Anne's County, Md., 1936–1937; Special Fellow, Memorial Hospital, New York, 1937–1939; Officer in Charge of the National Cancer Control Program of the National Cancer Institute, 1939–1942; Assignments with the Public Health Branch, Military Government, U. S. Army, for which he was awarded the Legion of Merit and American Typhus Medal, 1943–1945; Assistant Chief, National Cancer Institute, 1946–1947; Assistant Surgeon General and Director of the Cancer Institute, 1947; Member of the American Public Health Association since 1937.

SECOND N.T.A. RESOLUTION ON LOCAL HEALTH UNITS

The following resolution was passed by the Board of Directors of the National Tuberculosis Association at its meeting on March 19:

The National Tuberculosis Association reemphasizes its policy that tuberculosis services, to be most effective, should be integrated with general community health facilities and to that end urges its state and local affiliates to work toward the establishment of adequately financed and adequately staffed local health services.

The National Tuberculosis Association endorses the principle enunciated by representatives of 65 national citizens' organizations in a meeting at Princeton, N.J., on September 10, 1947, to the effect that vigorous steps be taken to obtain complete coverage of all states and all communities by local full-time health units under competent professional direction.

The National Tuberculosis Association offers its coöperation to the National Health Council in this program.

The National Tuberculosis Association further endorses in principle the need for federal legislation and assistance to states to complete the coverage of their respective populations and areas with full-time local health units under professional direction.

An earlier resolution of the N.T.A. urged its state and local affiliates to cooperate in developing local official health services as a necessary prerequisite to effective local tuberculosis control activities.

INTERNATIONAL POLIOMYELITIS CONFERENCE

The First International Conference on Poliomyelitis in New York City, July 12–17, was announced briefly in the February *Journal* (p. 252).

More detailed plans are now available. Ten world medical and research authorities on poliomyelitis have been named presiding officers for the plenary sessions. These presiding officers and subjects include:

Oswaldo P. Campos, Clinical Orthopedic Surgeon, Hospital Jesus, Rio de Janeiro, Brazil, "The Importance of Poliomyelitis as a World Problem"; Rustin McIntosh, Professor of Pediatrics, Columbia University, "Poliomyelitis: The Early Stage"; Robert Kno-Song Lim, Surgeon General, National Defense Medical Center, Shanghai, China, "The Management of Poliomyelitis: The Early Stage"; Arthur Steindler, Professor of Orthopedic Surgery, State University of Iowa, "Poliomyelitis: The Convalescent Stage"; Arvid Wallgren, Professor of Pediatrics, Royal Caroline Medical Institute, Stockholm, Sweden, "The Management of Poliomyelitis: The Convalescent Stage"; Carlos S. Ottolenghi, Docente Libre de Ortopedia, Buenos Aires, Argentina, "The Management of Poliomyelitis: The Late Stage"; James E. Paullin, Professor of Clinical Medicine, Emory University, "Bulbar Poliomyelitis"; Pierre L. LePine, Director of Laboratories, Pasteur Institute, Paris, "Immunology and Chemotherapy in Poliomyelitis"; Harry S. Mustard, Commissioner of Health, New York City, "The Public Health Aspects of Epidemic Poliomyelitis"; and Thomas Parran, Surgeon General, U. S. Public Health Service, "Poliomyelitis Throughout the World."

The Conference is being held under the auspices of the National Foundation for Infantile Paralysis with the coöperation of 23 United States government agencies and scientific societies, among them the American Public Health Association.

Conference headquarters have been set up in the Waldorf Astoria Hotel, New York City.

INSECT CONTROL IN RETROSPECT

This announcement will be too late to be of any great benefit to health workers in the field. However, it may tend to indicate trends which are taking place in insect control activities. Within almost a week, notices were received of two conferences for pest control operators; the first, that of the New York State Pest Control Association held at Cornell University, March 29–30, and second, that of the 12th Annual Purdue Pest Control Operators Conference held at Purdue University, April 5–9. Anyone who may be interested in programs or methods of organization should write

to Charles E. Palm, Entomology Department, Cornell University, Ithaca, N. Y., for the former, and to Professor J. J. Davis, Agricultural Hall, Purdue University, Lafayette, Ind., for the latter.

WATER EMERGENCY PUBLICITY MATERIAL

The Mathieson Alkali Works has prepared and distributed to state health officers in areas likely to be affected, a packet of material designed to advise the public of necessary emergency health measures in the event of floods. Included in the packet are releases for use in newspapers before, during, and after a flood. There are similar releases for radio broadcasts and a bulletin for posting in public places. Also included are recommendations concerning typhoid inoculations, treatment of water for drinking and cooking purposes, handling of contaminated food and food containers, disinfecting wells in flood areas, and clean-up of buildings after floods. A list of distributors handling chemicals which might be in demand during flood emergencies is also contained in the packet. For further information, write to Mathieson Alkali Works, Inc., 60 East 42 Street, New York 17, N. Y.

NEW ENGLAND MEETING

The annual Massachusetts Public Health Conference and the New England Health Institute will be held at the University of Massachusetts, at Amherst from June 16 to 18, 1948. Among the speakers at this three day session are:

Martha M. Eliot, M.D., President, A.P.H.A.

Leonard A. Scheele, M.D., Surgeon-General, U.S.P.H.S.

Ira V. Hiscock, Sc.D., Professor of Public Health, Yale University

Hugh R. Leavell, M.D., Professor of Public Health Practice, Harvard University

V. A. Van Volkenburgh, M.D., Assistant Commissioner, New York State Department of Health

Charles F. Wilinsky, M.D., President-Elect A.P.H.A., will preside, and the New England state health commissioners will participate.

All members of the A.P.H.A. are invited and ample dormitory accommodations are available for all who wish to attend.

HEARING ON LOCAL HEALTH SERVICES BILL

The Committee on Interstate and Foreign Commerce of the House of Representatives held a hearing on the Local Health Services Bill (H.R. 5644 and 5678) on April 8. Five members of the committee were present and heard testimony in favor of the bill from Mrs. L. W. Hughes, President of the National Congress of Parents and Teachers, James R. Miller, M.D., member of the Board of Trustees of the American Medical Association, Vlado A. Getting, M.D., President of the State and Territorial Health Officers Association and Haven Emerson, M.D.

The only opposing testimony, based on a fear of further federal centralization, was given by H. B. Anderson, Secretary of the Citizen's Medical Reference Bureau. He testified that he represented a membership of 1,000 members who had not previously been consulted, but would approve his action at a later date.

No hearing has yet been held on the identical Senate bill providing for federal grants-in-aid to state health departments earmarked specifically for the development of local health units on the basis of an overall state plan. The Chairman of the Senate Subcommittee on Health of the Committee on Labor and Welfare is Senator H. Alexander Smith of New Jersey.

PREVENTIVE MEDICINE TO THE FORE

At the Health and Family Life Symposium of the Community Service Society of New York, on March 18, Bailey

B. Burritt, the retired Director of the Society and Executive Director of the National Health Council, announced a project for the study of 200 families who live in one of New York City's neighborhoods to learn "what preventive and health maintenance services would be effective and practical." This service would utilize many of the techniques learned by the Peckham experiment in England. This experiment and its results were discussed at the same meeting by Dr. Innes Pearse, medical director.

Among other current activities, in exploring the possibilities of preventive medicine, is the University of Minnesota's project whereby 300 St. Paul and Minnesota volunteers in the prime of life are being examined periodically for 10 years by clinicians in order chiefly to note the factors that account for high blood pressure and for hardening of the arteries.

In New York City, the Health Commissioner, Harry S. Mustard, M.D., has appointed C. Ward Crampton, M.D., Chairman of an advisory committee on geriatrics. New York State has a joint legislative commission on problems of aging.

GRADUATE FELLOWSHIPS IN COMMUNITY NUTRITION AT THE UNIVERSITY OF TENNESSEE

The College of Home Economics of the University of Tennessee offers several one year graduate fellowships in Community Nutrition of $1,200 and free tuition. The program, leading to the degree of Master of Science in Community Nutrition, includes three-quarters of work in residence at the university and one-quarter of supervised field work in a health agency. Candidates are trained for positions as nutritionists with health and welfare agencies.

Academic requirement for admission is a baccalaureate degree in home economics with a major in foods and nutrition, or its equivalent. Two years of experience such as teaching, extension work, Farmers Home Agency work, hospital, or other food service or equivalent, are required. Interests and ability of the candidate are considered in accepting students for training.

Application blanks and further information may be obtained from the College of Home Economics, University of Tennessee, Knoxville.

FIRST NATIONAL SANITATION CLINIC

The first National Sanitation Clinic will be held at the University of Michigan, June 21–25 with the coöperation of the National Sanitation Foundation. Approximately 250 participants will divide themselves into 12 clinic groups for intensive deliberations on as many subjects related to food sanitation. In general each group will include 6 representatives from public health and 6 from industry, 2 co-chairmen, and from 2 to 5 consultants.

The stated purpose of the clinic is to discuss various phases of environmental sanitation control—with particular reference to foods—in an effort to arrive at a statement of principles, methods of procedure, equipment, etc., that are acceptable to public health officials and to industry. It is hoped that the agreements reached in this group may be approved by both public health officials and industry as reasonable goals and guides in food sanitation.

DR. HILLEBOE MAKES TRIP TO EUROPE

Herman E. Hilleboe, M. D., New York State Commissioner of Health, spent the last half of February on a trip to Europe, going first to Geneva, Switzerland, where he represented the United States in a four day discussion of worldwide tuberculosis control with members of the Expert Committee on Tuberculosis of the Interim Commission of the World Health Organization.

In addition, Dr. Hilleboe had a one day conference on tuberculosis control

with Rome public health physicians, made a three day study in Athens of the mass BCG vaccination program now in progress in Greece, and examined the research work currently being conducted by the State Serum Institute of Denmark in Copenhagen. There a coöperative research project was formulated to be carried on by the Serum Institute and the New York State Health Department's Division of Laboratories and Research.

TEXAS PUBLIC HEALTH ASSOCIATION

The Texas Public Health Association held its Annual Meeting in Houston February 22–25. This meeting was the largest ever held, with a total attendance of 575.

The out-of-state speakers included Pearl McIver, R.N., Martin A. Frobisher, Jr., D.Sc., Charles B. Frasher of the A.P.H.A. Merit System Service, Albert E. Bailey, Ph.D., James A. Doull, M.D., and Ira V. Hiscock, Sc.D., who led a panel on Public Health Administrative Practices.

The new officers of the Texas society are:

President—Austin E. Hill, M.D.
President-elect—W. R. Ross, M.D.
1st Vice-President—B. A. Young
2nd Vice-President—Belle Blackwell, R.N.
Executive Secretary—Earle W. Sudderth

A.P.H.A. UNDERTAKES STATE STUDY IN PENNSYLVANIA

Norris W. Vaux, M.D., Secretary of Health for Pennsylvania, has recently announced a survey of public health activities of Pennsylvania by the Committee on Administrative Practice of the American Public Health Association.

In commenting on this study, Dr. Vaux said:

> The Pennsylvania Department of Health has had a long and honorable history. Its activities through the years have expanded with increasing knowledge in the techniques of preventive medicine and in the control of disease.
>
> This expansion has been so rapid and diverse that there has been little opportunity to pause and take stock, an essential practice for every organization that wants to know its present status and what future direction it should take.
>
> With this thought in mind, Governor Duff, and I, believe that a thoroughgoing evaluation of the Commonwealth's public health administration which will measure structure and activities against currently accepted public health procedures and practice will be of value in strengthening the resources of the Department and in assuring it of an administrative structure soundly conceived and adequately operated.
>
> With the Governor's approval, therefore, the Department of Health has requested the American Public Health Association through its Committee on Administrative Practice, which has conducted many local health studies, to survey the public health activities of Pennsylvania.
>
> Important among the aspects of this survey will be the efficiency, extent, and effectiveness of (1) the state Department of Health; (2) local health services to communities; and (3) the relationship of the state voluntary health agencies to the state and local health services.

A representative committee of public minded and influential citizens, now being appointed by Governor Duff, will serve in an advisory capacity and Dr. Vaux has expressed the hope that this committee will be an effective instrument for implementing the survey's recommendations.

N.T.A. POLICY ON BCG VACCINATION

The Executive Committee of the American Trudeau Society, the medical section of the National Tuberculosis Association, recently adopted a statement of policy with respect to BCG vaccination against tuberculosis. Because such vaccination does not provide complete protection against tuberculosis its use for the general population is not recommended until further controlled studies are conducted.

The Society's recommended policy is for BCG vaccination of members of groups constantly exposed to tuberculosis if they have a negative reaction to the tuberculin test. The person with a positive reaction, indicating that he has had a primary tuberculosis infection

and his body has built up a degree of acquired immunity, probably does not benefit from BCG vaccination. For the present, therefore, BCG vaccination is recommended for doctors, medical students and nurses, hospital and laboratory personnel in contact with the tuberlosis bacillus, individuals unavoidably exposed to tuberculosis in the home, and patients and employees of mental hospitals, prisons, and other custodial institutions.

The Society warns against placing complete reliance on BCG even for these groups and points out that proper precautions should be taken to minimize or prevent "undue hazardous exposure of hospital patients and personnel and members of a household if an infectious patient is under treatment in the home."

PERSONNEL AND SERVICES OF LOCAL HEALTH UNITS

The U. S. Public Health Service through the Records and Reports Unit of the Bureau of State Services has just published a report of public health resources in local full-time health jurisdictions, including state districts. The number of personnel in 4 categories is analyzed according to whether they meet the minimum standards set up by the Subcommittee on Local Health Units in its report, *Local Health Units for the Nation*.

The report also gives detailed information on public health clinic service available in local jurisdictions receiving federal-state financial aid.

The report, prepared by Evelyn Flook and Arthur P. Gill, is available from the Bureau of State Services, U. S. Public Health Service, Washington 25, D. C.

FIELD TRAINING IN PUBLIC HEALTH ENGINEERING

The Michigan Department of Health announces summer field training opportunities to individuals desiring experience in public health engineering work. The program will be similar to one conducted by the department last year.

Graduates or undergraduates of recognized professional schools with training in one of the branches of public health (engineering, dairy science, food technology, bacteriology, etc.) will be accepted. Undergraduates must have completed their junior year of study. Assignments will be to county health departments with special facilities for the training. Stipends of $150 per month will be paid each candidate by the W. K. Kellogg Foundation. Veterans are entitled to the federal subsistence allowance while in training. Work will start about June 14 and continue to the middle of September.

Additional information can be obtained from John M. Hepler, Director, Bureau of Engineering, Michigan Department of Health, Lansing.

MARKLE FOUNDATION MEDICAL SCHOLARS

With the avowed purpose of relieving the current shortage of scientists equipped to carry on and teach research, the John and Mary R. Markle Foundation of New York recently announced a "Scholars in Medical Science" program. A total of $400,000 has been allocated to support, for a 5 year period, 16 doctors carrying on research in a variety of medical subjects in 16 different universities.

100 YEARS OF A.A.A.S.

Planning has begun for the centenary celebration of the founding of the American Association for the Advancement of Science. Chairman of the Centennial Policy Committee is Dr. Harlow Shapley, Director of the Harvard Observatory. The keynote of the meeting, to be held in Washington, D. C., September 13–17, is "One World of Science." Preliminary plans call for technical symposia, 4 or 5 concurrently each morning, for free afternoons to visit the scientific and cultural institutions of Washington,

and for non-technical broad surveys of current progress in important fields of science for the evenings.

NATIONAL HEART INSTITUTE PROPOSED BY SENATE BILL

On February 25, Senators Ives, Bridges, Murray, and Pepper introduced the bi-partisan bill S2215, which would establish a National Heart Institute under the U. S. Public Health Service. It would provide greatly increased federal support of research in and control of cardiovascular diseases. The bill differs only slightly from the Keefe and Smathers bills introduced in the House in January.

U. S. PUBLIC HEALTH SERVICE 1949 BUDGET

The Washington Report on the Medical Sciences, a weekly newsletter concerning medical and public health matters, reports liberal grants to the U. S. Public Health Service by recent action of the House Appropriations Committee. The overall 1949 budget approved for the Service was $173,230,500, an increase of 30 per cent over the previous year. Seventeen million dollars was approved for venereal disease control. Because the committee was impressed with the BCG studies conducted by the Public Health Service, over 9 million dollars was appropriated for tuberculosis control, two-thirds of which is for grants-in-aid to state and local health departments.

The National Institute of Health was granted its full request of $13,570,000, plus an additional $100,000 for peptic ulcer research. More than half of the institute's appropriation is for research grants to hospitals, clinics, universities, and other organizations.

The Institute's funds for cardiovascular studies were increased from half a million in 1948 to $1,382,500 in the 1949 appropriation of the House. The cancer appropriation of $14,000,000 was renewed plus an additional $8,000,000 recommended for grants-in-aid for planning, land acquisition, and building of research centers.

A new item of a million and a half dollars was recommended for nation-wide demonstrations in schools of the effectiveness of sodium fluoride in preventing tooth decay.

PERSONALS

Central States

C. A. ABELE, formerly Director of the Country Dairy Inspection Section of the Chicago Health Department since 1940, has recently become Director of Public Health Research of the Diversey Corporation, also of Chicago. Mr. Abele organized and served for 20 years, the Bureau of Inspection for the Alabama State Department of Health. He is a referee on the Committee on Standard Methods for Dairy Products, A.P.H.A.

CORINNE EDDY, M.D.,† was appointed Health Officer for the DeWitt-Piatt County (Illinois) Health Department with offices in Clinton on January 1. Dr. Eddy was formerly Director of the City-County Health Department, Lincoln, Neb.

DONALD M. HARRIS, M.D.,* became Health Officer of the newly organized full-time Health Department of Gary, Ind., on February 1. According to the *Monthly Bulletin* of the Indiana State Board of Health he is "the first formally trained full-time health officer (local) in Indiana." He had previously served in local health units in Iowa, Michigan, and Nebraska.

J. P. OWENS, M.D., has been named to succeed E. H. SCHOENLING, M.D., as Hamilton County, Ohio, Health Commissioner. Dr. Owens has been a practising physician in Cincinnati chiefly interested in industrial medicine.

Eastern States

WENDELL R. AMES, M.D.,* former Health Commissioner of the Cattaraugus County, N. Y., Health Department, has been appointed Deputy Health Commissioner for Preventable Diseases, including tuberculosis control of the new Buffalo City-Erie County Health Department.

CHARLES S. CAMERON, M.D., recently a corps member of the U. S. Naval Medical Corps, has been appointed Medical Director of the American Cancer Society, New York, N. Y. Dr. Cameron is a Fellow of the American College of Surgeons.

J. ELLIOTT HALE,† formerly Director of the Industrial Hygiene Division of the Bureau of Health, Maine State Department of Health and Welfare, has taken up new duties as Superintendent of the Kennebec, Me., Water District.

GEORGE E. LAUBACH, licensed Health Officer in New Jersey, became Health Officer of the City of Elizabeth on January 15. He had previously been Health Officer of Dover.

EARL LUDLAM, D.D.S., has succeeded J. M. WISAN, D.D.S.,* as Chief of the Division of Dental Hygiene of the New Jersey State Health Department. He has been Assistant Director of the division for the past 10 years. Dr. Wisan resigned to become Director of the Division of Health Education of the American Dental Association whose headquarters are in Chicago, Ill.

CLINTON P. MCCORD, M.D., of Albany, N. Y., has been appointed as Consultant in Psychosomatic Medicine in the New York State Department of Health, preparatory to the launching of a state-wide educational program related to emotional factors in disease. Dr. McCord has been practising neuro-psychiatry and analytic psychiatry for the past 35 years and is a Diplomate of the American Board of Neurology and Psychiatry and Consultant to the Albany Society for Advancement of Psychosomatic Medicine.

WILLYS M. MONROE, M.D.,† will become Health Officer of Greenwich, Conn., on July 1. He has been Health Commissioner of Pittsfield, Mass., since 1923 and served in both world wars, returning from recent military service with the rank of lieutenant colonel.

PHILIP S. PLATT,* Director of Lighthouse of the New York Association for the Blind spoke on voluntary health agencies at the annual meeting on April 15 of the Hartford, Conn., Tuberculosis and Public Health Society.

WILLIAM REINER-DEUTSCH, M.D.,† Director of Industrial Testing Laboratories and Technical Director of the National Brewers' Academy and Consulting Bureau, New York, N. Y. has been elected corresponding member of the Societé de Biologie de France.

ELIZABETH P. RICE, formerly clinical professor of the social aspects of medicine at the Yale School of Medicine, New Haven, Conn., and assistant professor of the social aspects of nursing at the Yale School of Nursing, has been appointed the first Social Service Worker to the Faculty of the Harvard School of Public Health, Boston, Mass., as part of a new program to study the role of family life in the health of children. Miss Rice will commence a study of the preventive aspects of social work.

HELEN E. WEAVER, R.N.,† has been appointed as Consultant in Nursing Activities, the National Society for the Prevention of Blindness, New York, N. Y. Miss Weaver was formerly Consultant Public Health Nurse of the Division of Venereal Disease Con-

* Fellow A.P.H.A.
† Member A.P.H.A.

trol, New York State Department of Health, Albany.

SIDNEY I. WOLFSON,† has resigned as assistant to the District State Health Office, Freehold, N. J., to become Health Officer of Dover.

MARGARET POND ZEALAND was appointed nutritionist of the New Jersey State Health Department in February. Mrs. Zealand formerly served as dietitian in several hospitals in New York City.

Southern States

HAROLD V. DARNELL, B.Sc., has been appointed as assistant to ROBERT P. FISCHELIS, M.D.,* Secretary of the American Pharmaceutical Association, Washington, D. C. Mr. Darnell has been Executive Secretary of the Indiana Pharmaceutical Association since 1939.

ESTHER M. FINLEY,* Senior Assistant Nurse Officer of the U. S. Public Health Service, Washington, D. C., has been appointed Director of the Public Health Nursing Program for the Kanawha-Charleston Health Department, W. Va.

JOSEF JORDAN WEISSKOPF, M.D.,† recently appointed Surgeon in the Reserve of the U. S. Public Health Service, was called to active duty as of April 30. Since January, 1945, he has been Chief, Planning Branch, Medical and Sanitation Supplies Division, UNRRA.

Western States

NEW MEMBERS OF THE FACULTY AT THE SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, ARE:

JACOB YERUSHALMY, Ph.D.,* as Professor of Biostatistics. Dr. Yerushalmy was formerly Principal Statistician, Division of Tuberculosis, U. S. Public Health Service. He recently returned from Denmark where he served as Consultant in the tuberculosis control program.

EDWIN H. LENNETTE, M.D., Ph.D., who recently became the director of the Virus Laboratory, California Department of Public Health, has also been appointed Lecturer in Public Health. Dr. Lennette was a member of the Field Staff of the International Health Division of the Rockefeller Foundation until 1946 when he became Chief of the Medical Veterinary Division of the War Department.

DAVID FROST, M.D.,† became the first full-time Health officer of the City of Alameda, Calif., in February, 1948. He was formerly Chief of Venereal Disease Control in the Oakland Health Department.

Other Areas

ROBERT H. MARKS, M.D.,† Chief of the Tuberculosis Bureau of the Hawaii Territorial Department of Health, has announced his resignation, effective February 26. He returns to the mainland as Medical Director of Jefferson Sanatorium, Birmingham, Ala.

LUIS M. MORALES, M.D., former President of the Medical Association of Puerto Rico, was elected a member of the Council of the National Committee on Mental Hygiene at the organization's recent annual meeting in New York.

Deaths

EDWARD THOMAS DEVINE, Ph.D., known in social work and reforms, died in Chicago on February 27, at the age of 80.

HAROLD GILBERT MCGEE,* Charter Fellow of the Engineering Section of the Association, and Director of the Municipal Research Bureau of the Akron Chamber of Commerce since 1923, died at his home in Hudson, Ohio, on February 13. Besides being a tax and

* Fellow A.P.H.A
† Member A.P.H.A.

finance expert in his early career he had also been Sanitary Engineer in the Michigan State and Jackson City Board of Health, and in the Ohio State and Lucas County boards. He was the author of numerous articles in engineering and public health journals as well as reports on municipal, school, county, and state budgets.

CONFERENCES AND DATES

American Association for the Advancement of Science. Centennial Meeting. Washington, D. C. September 13–17.

American Congress of Physical Medicine. Hotel Statler. Washington, D. C. September 7–11.

American Dairy Science Association. University of Georgia, Athens, Ga. June 14–16.

American Dental Association. Chicago, Ill. Week of September 12.

American Dietetic Association. Boston, Mass. October 18–22.

American Hearing Society. National Conference and Annual Meeting. Pittsburgh, Pa. May 19–23.

American Home Economics Association. 39th Annual Meeting. Minneapolis, Minn. June 21–24.

American Hospital Association. 50th Anniversary Convention. Atlantic City, N. J. September 20–24.

American Library Association. Atlantic City, N. J. June 13–19.

American Occupational Therapy Association. Hotel Pennsylvania, New York, N. Y. Sept. 7–11.

American Public Health Association—76th Annual Meeting. Boston, Mass. November 8–12.

American Public Works Association. Boston, Mass. October 17–20.

American Red Cross. San Francisco, Calif. June 20–24.

American Society for the Study of Sterility. Fourth Annual National Session. Chicago, Ill. June 21–22.

American Society of Planning Officials. New York, N. Y. October 11–13.

Biennial Nursing Convention — American Nurses Association, National Organization for Public Health Nursing, National League of Nursing Education. Chicago, Ill. May 31–June 4.

Canadian Public Health Association. Vancouver, B. C. May 18–20.

Civil Service Assembly of the United States and Canada. Ottawa, Canada. October 4–7.

Colorado Public Health Association. Savoy Hotel, Denver, Colo. May 21–22.

Conference of State and Provincial Health Authorities. Chicago, Ill. June 25–26.

Connecticut Public Health Association. New Haven, Conn. May 12.

First International Poliomyelitis Conference. Waldorf Astoria. New York, N. Y. June 12–17.

Florida Public Health Association. Panama City, Fla. October 7–9.

Fourth International Congresses on Tropical Medicine and Malaria. Washington, D. C. May 10–18.

Georgia Public Health Association. Savannah, Ga. May 10–12.

Indiana Public Health Association. Indianapolis, Ind. June 2–3.

International Congress on Mental Health. London, England. August 11–21.

International Federation of Housing and Town Planning. Zurich, Switzerland. July 20–26.

Iowa Public Health Association. Annual Meeting. Burlington, Iowa. May 27–28.

Massachusetts Public Health Association. Amherst, Mass. June 16–18.

Missouri Public Health Association. Hotel Chase, St. Louis, Mo. May 12–14.

National Association of Sanitarians. Portland, Ore. June 7–9.

National Education Association of the United States. Cleveland, Ohio. July 5–9.

National Gastroenterological Association. New York, N. Y. June 7–10.

National Tuberculosis Association. Annual Meeting. New York, N. Y. Week of June 14.

New England Health Institute. Amherst, Mass. June 16–18.

New Mexico Public Health Association, Las Cruces, N. M. May 20–22.

New York State Association of Milk Sanitarians. Buffalo, N. Y. September 22–24.

Society of American Bacteriologists. Minneapolis, Minn. May 10–14.

Tennessee Public Health Association. Andrew Jackson Hotel, Nashville, Tenn. May 3–5.

Utah Public Health Association, with Western Branch A.P.H.A. Salt Lake City, Utah. May 25–27.

Western Branch, American Public Health Association. Salt Lake City, Utah. May 25–27.

West Virginia Public Health Association. Prichard Hotel, Huntington, W. V. May 27–28.

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Literature explaining the role of bacteria in milk and their control is available for farmers. Programs of education also on request. Send for them—by writing to B-K Division, Pennsylvania Salt Manufacturing Company, 1000 Widener Building, Philadelphia 7, Pa.

*Reg. U. S. Pat. Off.

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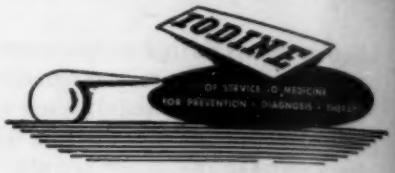

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